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Guide To Wheat Hardness

GUIDE TO WHEAT HARDNESS

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Introduction

The Official U.S. Standards for Wheat divides wheat into seven classes, such as soft red winter, hard red winter, hard red spring, and white. Wheat class, the first determination made on wheat after dockage removal, is used as an indicator of appropriate end use. Currently, wheat class is determined solely by visual inspection of kernel color and such morphological characteristics as kernel shape and length, and shapes of the germ, crease, and brush. If a wheat sample has the specified external kernel characteristics of a hard or soft wheat, it is so identified without any physical determination of its relative hardness or softness.

However, many newly released varieties no longer exhibit the traditional visual characteristics of their class. For example, some soft red winter varieties have kernel characteristics previously exhibited only by hard red winter varieties and vice versa. Since the "hard" or "soft" designation provides important information on tempering and milling requirements and end-use performance, proper classification of wheat is important to orderly marketing and utilization.

The U.S. Congress in the Food Security Act of 1985, PL-99-198 (farm bill), charged the Federal Grain Inspection Service (FGIS) and the Agricultural

Research Service (ARS) to collaborate in the development of a new system of classifying wheat. In June 1986, the Administrator of FGIS established the Wheat Classification Working Group (WCWG) to guide and oversee the ongoing effort to develop such a system. WCWG membership was drawn from all relevant sectors of the wheat industry, including growers, seed producers, breeders, millers, end users, and trade organizations. The primary goal of the collaborative effort by FGIS, ARS, and WCWG is to establish an objective, accurate, and efficient system for classifying wheat. Also, the WCWG has insisted that the system pose no major risk of market disruption. Consistent with these requirements, the collaborators identified the development of an objective method for measuring hardness as their first objective.

Wheat hardness, despite wide usage, is a concept for which no physical-property definition has been universally accepted. In 1986, Norris et al. (in press) developed a definition of wheat hardness based on certain near-infrared reflectance (NIR) measurements of ground wheat samples. The basis of their definition is that (1) the particle size of ground wheat correlates directly with the hardness of the wheat kernel and (2) near-infrared light is more highly absorbed by larger particles than by smaller particles. They developed a standardized procedure for grinding wheat samples, taking the required NIR measurements, and translating the measurements into hardness scores. Their procedure was verified by a collaborative study and accepted as a standard by the American Association of Cereal Chemists (AACC) (1986). The WCWG has endorsed NIR hardness scores as the reference definition of wheat hardness; it has also endorsed the development of any new classification system that is based on those scores.

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Sample collection by Joe Hampton of the ENID Board of Trade and Rollie Sears of Kansas State University, and the assistance of Joyce Shaffer, ARS, in sample analysis are greatly appreciated.

An advantage of developing such a system is that NIR wheat hardness can be measured by most NIR instruments currently available for use with agricultural commodities. NIR instruments are used, for example, to measure protein in the national wheat inspection system, and to measure chemical components of forages and feedstuffs.

This publication presents the results of a study to determine the NIR hardness scores for a broad spectrum of wheat varieties grown at different locations. The scores represent an important first step in the development of a new wheat classification system. They form an initial data base from which some understanding may be gained about the effects of variety, growing conditions, and environment on wheat hardness. In addition, the values represent the first objective evaluation of wheat hardness nationwide and can help wheat growers, breeders, millers, and bakers select the wheat hardnesses best suited to their specific applications.

Procedure

Approximately 1,900 wheat samples were collected for this hardness study during the 1988 crop year. Samples were obtained from 10 States and include more than 125 varieties. Two sets of wheat samples were collected: one, drawn from commercial channels and identified as to variety by the farmer at the time of delivery to the local grain elevator; the second, from wheat breeders' variety trials. All samples were cleaned prior to analysis by official FGIS procedures to remove dockage and shrunken and broken kernels.

The samples (about 15 g per sample) were ground in a UDY cyclone grinder (model 3010-018), passed through a 1-mm screen, and analyzed with a Pacific Scientific spectrophotometer (model 6250).

Standardization of the NIR hardness measurement for the grinder, the spectrophotometer, and the laboratory technician involved in this study were conducted according to the AACC method by using the FGIS standard reference samples. The standardization for this study resulted in an average variance of 3 between replications.

Discussion

NIR hardness was developed on a scale of 0-100, 100 being the hardest. Soft wheats typically scored about 25 and hard wheats about 75. A specified hardness score does not necessarily imply the same level of quality to all end users, since the significance of a hardness value or range is established by the end user for each end product.

The NIR wheat hardness values are shown for the samples in tables 1-4. Tables 1 and 3 show the hardness values for the samples collected through commercial channels, while tables 2 and 4 show the hardness values for samples collected from the breeders' variety trials. Tables 1 and 2 are organized alphabetically by State abbreviation and then by region (city or county) within the State, and finally by NIR hardness within each variety. Tables 3 and 4 are organized alphabetically by variety and then by NIR wheat hardness within each variety. Table 5 summarizes the NIR hardness information by giving the average hardness value for each variety within each State.

In addition to information about wheat hardness for specified varieties and locations, the hardness tables provide information about the combined effects of variety and location on wheat hardness. For example, the four common hard red spring wheat varieties Butte-86, Len, Marshall, and Stoa show a general pattern of increasing hardness with increasing latitude. The soft

wheat variety Caldwell appears to be softer when grown in Kansas than when grown in Ohio or Missouri. Among the varieties of hard red winter wheat from Oklahoma or Texas, Mustang and Tam-101 could be expected to be harder than Chisholm.

Occasionally, the tables show that only a few samples were analyzed for a given variety and region. In those instances, the reader is reminded that the NIR hardness scores may not be representative of that variety over the entire region. Also, hardness values can fluctuate under varying environmental conditions, and the data presented here represent only wheat samples collected in the 1988 crop year. For example, the hardness values of wheats grown in Reno County, KS, are lower than expected because of kernel

shrivel due to a heavy infection by wheat streak mosaic virus. The variety names identified for the samples collected in this study were not verified, and the names shown may be incomplete in some cases.

Literature Cited

American Association of Cereal Chemists. 1986. Method 39-70. Wheat Hardness as Determined by Near-Infrared Reflectance. Rev. 11-4-87. Approved Methods of the American Association of Cereal Chemists. 8th Ed. St. Paul, MN.

Norris, K.H., W.R. Hruschka, M.M. Bean, and D.C. Slaughter. [In press.] A definition of wheat hardness using near-infrared reflectance spectroscopy. Cereal Foods World.

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
CA	ARBUCKLE	95912	ANZA	HRW	68
CA	ARBUCKLE	95912	ANZA	HRW	69
CA	ARBUCKLE	95912	ANZA	HRW	73
CA	ARBUCKLE	95912	ANZA	HRW	75
CA	CHICO	95926	ANZA	HRW	77
CA	CLARKSBURG	95612	ANZA	HRW	73
CA	CLARKSBURG	95612	ANZA	HRW	76
CA	DAVIS	95616	ANZA	HRW	73
CA	DIXON	95620	KLASSIC	HWW	62
CA	DIXON	95620	KLASSIC	HWW	62
CA	DIXON	95620	KLASSIC	HWW	64
CA	DIXON	95620	KLASSIC	HWW	64
CA	DIXON	95620	KLASSIC	HWW	65
CA	DIXON	95620	KLASSIC	HWW	68
CA	DIXON	95620	KLASSIC	HWW	68
CA	GERBER	96035	ANZA	HRW	66
CA	GOSHEN	93227	YECORA-ROJO	HRW	71
CA	GOSHEN	93227	YECORA-ROJO	HRW	71
CA	GOSHEN	93227	YECORA-ROJO	HRW	71
CA	GOSHEN	93227	YECORA-ROJO	HRW	71
CA	GOSHEN	93227	YECORA-ROJO	HRW	71
CA	GOSHEN	93227	YECORA-ROJO	HRW	72
CA	GOSHEN	93227	YECORA-ROJO	HRW	72
CA	GOSHEN	93227	YECORA-ROJO	HRW	72
CA	GOSHEN	93227	YECORA-ROJO	HRW	72
CA	GOSHEN	93227	YECORA-ROJO	HRW	72
CA	GOSHEN	93227	YECORA-ROJO	HRW	73
CA	GOSHEN	93227	YECORA-ROJO	HRW	73
CA	GOSHEN	93227	YECORA-ROJO	HRW	73
CA	GOSHEN	93227	YECORA-ROJO	HRW	73
CA	GOSHEN	93227	YECORA-ROJO	HRW	74
CA	GOSHEN	93227	YECORA-ROJO	HRW	74
CA	GOSHEN	93227	YECORA-ROJO	HRW	75
CA	GOSHEN	93227	YECORA-ROJO	HRW	76
CA	GOSHEN	93227	YECORA-ROJO	HRW	76
CA	GOSHEN	93227	YECORA-ROJO	HRW	77
CA	GOSHEN	93227	YECORA-ROJO	HRW	77
CA	PALERNEO	95968	ANZA	HRW	76
CA	VACAVILLE	95688	ANZA	HRW	77
CA	WALNUT-GROVE	95690	ANZA	HRW	75
CA	WALNUT-GROVE	95690	ANZA	HRW	78
CA	WALNUT-GROVE	95690	ANZA	HRW	83
CA	WOODLAND	95695	ANZA	HRW	77
CA	WOODLAND	95695	ANZA	HRW	77
CA	WOODLAND	95695	ANZA	HRW	84
CO	ARRIBA	80804	SANDY	HRW	72
CO	COPE	80812	HAWK	HRW	75
CO	COPE	80812	TAM-105	HRW	83
CO	HUGO	80821	TAM-107	HRW	80
CO	IDALIA	80735	BRULE	HRW	46
CO	IDALIA	80735	BRULE	HRW	61
CO	IDALIA	80735	HAWK	HRW	61

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
CO	IDALIA	80735	MUSTANG	HRW	53
CO	IDALIA	80735	SCOUT-66	HRW	62
CO	IDALIA	80735	SCOUT-66	HRW	65
CO	IDALIA	80735	TAM-107	HRW	66
CO	IDALIA	80735	TAM-108	HRW	33
CO	IDALIA	80735	THUNDERBIRD	HRW	66
CO	IDALIA	80735	VICTORY	HRW	60
CO	IDALIA	80735	WINGS	HRW	45
CO	IDALIA	80735	WINGS	HRW	50
CO	LIMON	80828	CARSON	HRW	65
CO	LIMON	80828	HAWK	HRW	70
CO	LIMON	80828	LARNED	HRW	69
CO	LIMON	80828	VICTORY	HRW	65
CO	LIMON	80828	VONA	HRW	65
CO	OTIS	80743	CARSON	HRW	68
CO	OTIS	80743	HAWK	HRW	66
CO	OTIS	80743	MESA	HRW	65
CO	OTIS	80743	MUSTANG	HRW	52
CO	OTIS	80743	NEWTON	HRW	57
CO	OTIS	80743	NEWTON	HRW	64
CO	OTIS	80743	STALLION	HRW	57
CO	OTIS	80743	TAM-107	HRW	79
CO	OTIS	80743	TAM-107	HRW	81
CO	OTIS	80743	TAM-107	HRW	85
CO	OTIS	80743	THUNDERBIRD	HRW	67
CO	OTIS	80743	VICTORY	HRW	65
CO	OTIS	80743	VICTORY	HRW	68
CO	OTIS	80743	VONA	HRW	68
CO	PEETZ	80747	BRULE	HRW	53
CO	PEETZ	80747	BRULE	HRW	62
CO	PEETZ	80747	BRULE	HRW	74
CO	PEETZ	80747	HAIL	HRW	58
CO	PEETZ	80747	HAWK	HRW	53
CO	PEETZ	80747	HAWK	HRW	61
CO	PEETZ	80747	SANDY	HRW	66
CO	PEETZ	80747	SCOUT	HRW	69
CO	PEETZ	80747	SUPER-HAWK	HRW	
CO	PEETZ	80747	TAM-108	HRW	
CO	PEETZ	80747	VONA	HRW	
CO	PEETZ	80747	VONA	HRW	
CO	PEETZ	80747	VONA	HRW	
CO	PEETZ	80747	VONA	HRW	
CO	PEETZ	80747	VONA	HRW	
CO	PIERCE	80650	SANDY	HRW	
CO	PIERCE	80650	SANDY	HRW	
CO	PIERCE	80650	SANDY	HRW	
CO	PIERCE	80650	SANDY	HRW	
CO	PIERCE	80650	SANDY	HRW	
CO	PIERCE	80650	SANDY	HRW	
CO	PIERCE	80650	SANDY	HRW	
CO	PIERCE	80650	SANDY	HRW	

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
CO	PIERCE	80650	SANDY	HRW	65
CO	PIERCE	80650	SANDY	HRW	65
CO	PIERCE	80650	SANDY	HRW	66
CO	PIERCE	80650	SANDY	HRW	67
CO	PIERCE	80650	SANDY	HRW	68
CO	PIERCE	80650	SANDY	HRW	68
CO	PIERCE	80650	SANDY	HRW	71
CO	RUSH	80833	BACA	HRW	63
CO	VILAS	81087	BACA	HRW	56
CO	VILAS	81087	BACA	HRW	59
CO	VILAS	81087	BACA	HRW	61
KS	ANTHONY	67003	ARKAN	HRW	62
KS	ANTHONY	67003	HAWK	HRW	55
KS	ANTHONY	67003	MUSTANG	HRW	53
KS	ANTHONY	67003	PIONEER-2157	HRW	51
KS	ANTHONY	67003	TAM-101	HRW	55
KS	ANTHONY	67003	TAM-101	HRW	58
KS	ANTHONY	67003	TRIUMPH	HRW	62
KS	ANTHONY	67003	WINGS	HRW	59
KS	ANTHONY	67003	WRANGLER	HRW	66
KS	ASHERVILLE	67420	ARKAN	HRW	63
KS	ASHERVILLE	67420	MUSTANG	HRW	69
KS	ASHERVILLE	67420	NEWTON	HRW	56
KS	ASHERVILLE	67420	PRO-BRAND-830	HRW	70
KS	ASHERVILLE	67420	PRO-BRAND-830	HRW	73
KS	ASHERVILLE	67420	TAM-105	HRW	60
KS	ASHERVILLE	67420	THUNDERBIRD	HRW	76
KS	ASHERVILLE	67420	TRAILBLAZER	HRW	67
KS	ASHERVILLE	67420	VICTORY	HRW	69
KS	ASHERVILLE	67420	VICTORY	HRW	75
KS	BLUE-RAPIDS	66411	ARKAN	HRW	62
KS	BLUE-RAPIDS	66411	ARKAN	HRW	67
KS	BLUE-RAPIDS	66411	HAWK	HRW	75
KS	BLUE-RAPIDS	66411	NEWTON	HRW	61
KS	BLUE-RAPIDS	66411	NEWTON	HRW	61
KS	BLUE-RAPIDS	66411	NEWTON	HRW	63
KS	BLUE-RAPIDS	66411	NEWTON	HRW	70
KS	BLUE-RAPIDS	66411	THUNDERBIRD	HRW	80
KS	BLUFF-CITY	67018	ARKAN	HRW	56
KS	BLUFF-CITY	67018	MUSTANG	HRW	58
KS	BLUFF-CITY	67018	PIONEER-2157	HRW	55
KS	BLUFF-CITY	67018	PIONEER-2157	HRW	57
KS	BLUFF-CITY	67018	PIONEER-2172	HRW	57
KS	BREWSTER	67732	EAGLE	HRW	73
KS	BREWSTER	67732	HAWK	HRW	64
KS	BREWSTER	67732	HAWK	HRW	65
KS	BREWSTER	67732	LARNED	HRW	74
KS	BREWSTER	67732	MUSTANG	HRW	62
KS	BREWSTER	67732	NEWTON	HRW	58
KS	BREWSTER	67732	NEWTON	HRW	61
KS	BREWSTER	67732	SCOUT-66	HRW	77

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	BREWSTER	67732	THUNDERBIRD	HRW	68
KS	BREWSTER	67732	THUNDERBIRD	HRW	82
KS	BURDICK	66838	ARKAN	HRW	63
KS	CANTON	67428	ARKAN	HRW	49
KS	CANTON	67428	ARKAN	HRW	52
KS	CANTON	67428	ARKAN	HRW	54
KS	CANTON	67428	ARKAN	HRW	60
KS	CANTON	67428	NEWTON	HRW	52
KS	CANTON	67428	PIONEER	HRW	53
KS	CANTON	67428	PIONEER-2157	HRW	51
KS	CANTON	67428	PRO-BRAND-830	HRW	72
KS	CANTON	67428	TRIUMPH	HRW	56
KS	CANTON	67428	VICTORY	HRW	51
KS	CHANUTE	66720	AGRI-PRO	HRW	52
KS	CHANUTE	66720	ARKAN	HRW	56
KS	CHANUTE	66720	ARKAN	HRW	57
KS	CHANUTE	66720	ARKAN	HRW	57
KS	CHANUTE	66720	MUSTANG	HRW	71
KS	CHANUTE	66720	PARKER	HRW	64
KS	CHANUTE	66720	PARKER	HRW	73
KS	CHANUTE	66720	TRIUMPH	HRW	59
KS	CHANUTE	66720	TRIUMPH	HRW	60
KS	CHANUTE	66720	TRIUMPH	HRW	70
KS	CHERRYVALE	67335	ARKAN	HRW	55
KS	CHERRYVALE	67335	ARKAN	HRW	57
KS	CHERRYVALE	67335	ARKAN	HRW	70
KS	CHERRYVALE	67335	CALDWELL	SRW	22
KS	CHERRYVALE	67335	CALDWELL	SRW	25
KS	CHERRYVALE	67335	MUSTANG	HRW	67
KS	CHERRYVALE	67335	TAM-107	HRW	57
KS	CHERRYVALE	67335	TAM-108	HRW	50
KS	CHERRYVALE	67335	VICTORY	HRW	60
KS	COLDWATER	67029	EAGLE	HRW	68
KS	COLDWATER	67029	HAWK	HRW	67
KS	COLDWATER	67029	MUSTANG	HRW	60
KS	COLDWATER	67029	SAGE	HRW	68
KS	COLDWATER	67029	SIOUXLAND	HRW	68
KS	COLDWATER	67029	THUNDERBIRD	HRW	69
KS	COLDWATER	67029	THUNDERBIRD	HRW	71
KS	COLDWATER	67029	VICTORY	HRW	71
KS	COLDWATER	67029	VONA	HRW	66
KS	CUNNINGHAM	67035	ARKAN	HRW	68
KS	CUNNINGHAM	67035	HAWK	HRW	70
KS	CUNNINGHAM	67035	NEWTON	HRW	60
KS	CUNNINGHAM	67035	VICTORY	HRW	67
KS	CUNNINGHAM	67035	WRANGLER	HRW	65
KS	DILLWYN	67557	ARKAN	HRW	64
KS	DILLWYN	67557	HAWK	HRW	71
KS	DILLWYN	67557	NEWTON	HRW	64
KS	DILLWYN	67557	TAM-108	HRW	55
KS	DILLWYN	67557	VICTORY	HRW	64

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	EUREKA	67045	ARKAN	HRW	58
KS	EUREKA	67045	ARKAN	HRW	58
KS	EUREKA	67045	ARKAN	HRW	61
KS	EUREKA	67045	ARKAN	HRW	62
KS	EUREKA	67045	ARKAN	HRW	63
KS	EUREKA	67045	ARKAN	HRW	68
KS	EUREKA	67045	ARKAN	HRW	69
KS	EUREKA	67045	THUNDERBIRD	HRW	65
KS	EUREKA	67045	TRIUMPH	HRW	57
KS	EUREKA	67045	VICTORY	HRW	63
KS	GENESEO	67444	ARKAN	HRW	53
KS	GENESEO	67444	ARKAN	HRW	58
KS	GENESEO	67444	ARKAN	HRW	60
KS	GENESEO	67444	ARKAN	HRW	62
KS	GENESEO	67444	ARKAN	HRW	63
KS	GENESEO	67444	CHENEY	HRW	72
KS	GENESEO	67444	NEWTON	HRW	52
KS	GENESEO	67444	NEWTON	HRW	56
KS	GENESEO	67444	NEWTON	HRW	56
KS	GENESEO	67444	SIOUXLAND	HRW	66
KS	GOODLAND	67735	BRULE	HRW	69
KS	GOODLAND	67735	GARST	HRW	65
KS	GOODLAND	67735	LARNED	HRW	62
KS	GOODLAND	67735	MUSTANG	HRW	60
KS	GOODLAND	67735	NEWTON	HRW	64
KS	GOODLAND	67735	NEWTON	HRW	64
KS	GOODLAND	67735	NEWTON	HRW	65
KS	GOODLAND	67735	NEWTON	HRW	65
KS	GOODLAND	67735	NEWTON	HRW	53
KS	GOODLAND	67735	PIONEER	HRW	67
KS	GOODLAND	67735	SCOUT-66	HRW	62
KS	HARDTNER	67057	ARKAN	HRW	40
KS	HARDTNER	67057	CHISHOLM	HRW	55
KS	HARDTNER	67057	PIONEER-2157	HRW	77
KS	HARDTNER	67057	ROCKY	HRW	64
KS	HARDTNER	67057	VICTORY	HRW	57
KS	HIAWATHA	66434	ARKAN	HRW	64
KS	HIAWATHA	66434	ARKAN	HRW	67
KS	HIAWATHA	66434	ARKAN	HRW	78
KS	HIAWATHA	66434	ARKAN	HRW	84
KS	HIAWATHA	66434	BOUNTY	HRW	77
KS	HIAWATHA	66434	NEWTON	HRW	64
KS	HIAWATHA	66434	PRO-BRAND-830	HRW	64
KS	HIAWATHA	66434	VICTORY	HRW	66
KS	HIAWATHA	66434	VICTORY	HRW	65
KS	HOLTON	66436	ARKAN	HRW	66
KS	HOLTON	66436	ARKAN	HRW	76
KS	HOLTON	66436	ARKAN	HRW	57
KS	HOLTON	66436	NEWTON	HRW	61
KS	HOLTON	66436	NEWTON	HRW	65
KS	HOLTON	66436	VICTORY	HRW	63

HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

	ZIPCODE	VARIETY	CLASS	HARDNESS
	66436	VICTORY	HRW	65
	66436	VICTORY	HRW	66
	66436	VICTORY	HRW	66
	67951	HAWK	HRW	74
	67951	MUSTANG	HRW	73
I	67951	MUSTANG	HRW	73
I	67951	MUSTANG	HRW	75
I	67951	MUSTANG	HRW	82
N	67951	NEWTON	HRW	63
N	67951	THUNDERBIRD	HRW	72
N	67951	THUNDERBIRD	HRW	79
N	67951	VICTORY	HRW	78
N	67951	VICTORY	HRW	79
NSON	67504	HAWK	HRW	69
NSON	67504	SIOUXLAND	HRW	62
RE	67854	EAGLE	HRW	69
RE	67854	HAWK	HRW	74
RE	67854	HAWK	HRW	77
RE	67854	LARNED	HRW	72
RE	67854	MUSTANG	HRW	73
RE	67854	MUSTANG	HRW	65
RE	67854	NEWTON	HRW	65
RE	67854	PIONEER-2157	HRW	76
RE	67854	SCOUT-66	HRW	77
RE	67854	TAM-107	HRW	73
RE	67854	VICTORY	HRW	71
RADO	67741	HAWK	HRW	74
RADO	67741	LARNED	HRW	60
RADO	67741	NEWTON	HRW	59
RADO	67741	VONA	HRW	61
MAN	67068	DODGE	HRW	57
MAN	67068	TRIUMPH	HRW	62
MAN	67068	VICTORY	HRW	68
S-CO	67839	HAWK	HRW	72
S-CO	67839	HAWK	HRW	74
S-CO	67839	LARNED	HRW	78
E-CO	67839	LARNED	HRW	67
E-CO	67839	MUSTANG	HRW	69
E-CO	67839	MUSTANG	HRW	62
E-CO	67839	NEWTON	HRW	61
IE-CO	67839	PIONEER-2157	HRW	79
IE-CO	67839	TAM-107	HRW	62
IE-CO	67839	VICTORY	HRW	35
OTI	67861	BOUNTY-205	HRW	39
OTI	67861	BOUNTY-205	HRW	78
OTI	67861	EAGLE	HRW	79
OTI	67861	EAGLE	HRW	65
OTI	67861	HAWK	HRW	75
OTI	67861	HAWK	HRW	64
OTI	67861	LARNED	HRW	66
OTI	67861	LARNED	HRW	69
OTI	67861	LARNED	HRW	

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	LEOTI	67861	LARNED	HRW	69
KS	LEOTI	67861	LARNED	HRW	75
KS	LEOTI	67861	LARNED	HRW	75
KS	LEOTI	67861	NEWTON	HRW	66
KS	LEOTI	67861	TAM-105	HRW	77
KS	LEOTI	67861	TAM-105	HRW	78
KS	LEOTI	67861	TAM-105	HRW	79
KS	LEOTI	67861	TAM-105	HRW	82
KS	LEOTI	67861	TAM-105	HRW	85
KS	LEOTI	67861	TAM-107	HRW	76
KS	LEOTI	67861	TAM-107	HRW	83
KS	LINCOLN	67455	ARKAN	HRW	64
KS	LINCOLN	67455	ARKAN	HRW	65
KS	LINCOLN	67455	ARKAN	HRW	65
KS	LINCOLN	67455	ARKAN	HRW	68
KS	LINCOLN	67455	GARST-HR64	HRW	76
KS	LINCOLN	67455	MUSTANG	HRW	66
KS	LINCOLN	67455	NK-830	HRW	76
KS	LINCOLN	67455	NK-830	HRW	78
KS	LINCOLN	67455	TAM-107	HRW	56
KS	LINCOLN	67455	VICTORY	HRW	67
KS	LONGFORD	67458	ARKAN	HRW	57
KS	LONGFORD	67458	NEWTON	HRW	56
KS	LONGFORD	67458	NEWTON	HRW	57
KS	LONGFORD	67458	PRO-BRAND-830	HRW	72
KS	LONGFORD	67458	VICTORY	HRW	61
KS	LONGFORD	67458	VICTORY	HRW	66
KS	LONGFORD	67458	VICTORY	HRW	66
KS	LORRAINE	67459	ARKAN	HRW	60
KS	LORRAINE	67459	ARKAN	HRW	60
KS	LORRAINE	67459	ARKAN	HRW	62
KS	LORRAINE	67459	MUSTANG	HRW	63
KS	LORRAINE	67459	PIONEER-2157	HRW	58
KS	LORRAINE	67459	PIONEER-2157	HRW	61
KS	LORRAINE	67459	PIONEER-2157	HRW	65
KS	LORRAINE	67459	PIONEER-2165	HRW	66
KS	LORRAINE	67459	PRO-BRAND-830	HRW	69
KS	LORRAINE	67459	VICTORY	HRW	61
KS	MANCHESTER	67463	MUSTANG	HRW	71
KS	MANCHESTER	67463	PRO-BRAND-830	HRW	61
KS	MANHATTAN	66502	ARKAN	HRW	55
KS	MANHATTAN	66502	ARKAN	HRW	58
KS	MANHATTAN	66502	ARKAN	HRW	66
KS	MANHATTAN	66502	MUSTANG	HRW	65
KS	MANHATTAN	66502	MUSTANG	HRW	75
KS	MANHATTAN	66502	NEWTON	HRW	61
KS	MANHATTAN	66502	NEWTON	HRW	66
KS	MANHATTAN	66502	TRIUMPH	HRW	75
KS	MANHATTAN	66502	VICTORY	HRW	62
KS	MANHATTAN	66502	VICTORY	HRW	68
KS	MINNEAPOLIS	67467	ARKAN	HRW	54

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	MINNEAPOLIS	67467	ARKAN	HRW	55
KS	MINNEAPOLIS	67467	ARKAN	HRW	62
KS	MINNEAPOLIS	67467	HAWK	HRW	56
KS	MINNEAPOLIS	67467	NEWTON	HRW	69
KS	MINNEAPOLIS	67467	NEWTON	HRW	76
KS	MINNEAPOLIS	67467	PIONEER-2157	HRW	56
KS	MINNEAPOLIS	67467	PRO-BRAND-830	HRW	65
KS	MINNEAPOLIS	67467	SIOUXLAND	HRW	67
KS	MINNEAPOLIS	67467	VICTORY	HRW	68
KS	OAKLEY	67748	EAGLE	HRW	67
KS	OAKLEY	67748	EAGLE	HRW	80
KS	OAKLEY	67748	HAWK	HRW	61
KS	OAKLEY	67748	LARNED	HRW	69
KS	OAKLEY	67748	LARNED	HRW	70
KS	OAKLEY	67748	LARNED	HRW	71
KS	OAKLEY	67748	NEWTON	HRW	62
KS	ONAGA	66521	ARKAN	HRW	62
KS	ONAGA	66521	ARKAN	HRW	66
KS	ONAGA	66521	ARKAN	HRW	66
KS	ONAGA	66521	GARST-HR64	HRW	62
KS	ONAGA	66521	NEWTON	HRW	58
KS	ONAGA	66521	NEWTON	HRW	61
KS	ONAGA	66521	NEWTON	HRW	62
KS	ONAGA	66521	NEWTON	HRW	76
KS	ONAGA	66521	TRAILBLAZER	HRW	59
KS	ONAGA	66521	VICTORY	HRW	62
KS	OSAGE-CITY	66523	ARKAN	HRW	55
KS	OSAGE-CITY	66523	ARKAN	HRW	60
KS	OSAGE-CITY	66523	ARKAN	HRW	61
KS	OSAGE-CITY	66523	ARKAN	HRW	64
KS	OSAGE-CITY	66523	ARKAN	HRW	67
KS	OSAGE-CITY	66523	PRO-BRAND-830	HRW	65
KS	OSAGE-CITY	66523	SIOUXLAND	HRW	55
KS	OSAGE-CITY	66523	SIOUXLAND	HRW	57
KS	OSAGE-CITY	66523	TAM-105	HRW	82
KS	OSAGE-CITY	66523	VICTORY	HRW	55
KS	PARK	67751	LARNED	HRW	65
KS	PARK	67751	LARNED	HRW	71
KS	PARK	67751	LARNED	HRW	74
KS	PARK	67751	NEWTON	HRW	56
KS	PARK	67751	NEWTON	HRW	56
KS	PARK	67751	NEWTON	HRW	57
KS	PARK	67751	TAM-105	HRW	60
KS	PARK	67751	TAM-107	HRW	70
KS	PARK	67751	VICTORY	HRW	76
KS	PHILLIPSBURG	67661	ARKAN	HRW	74
KS	PHILLIPSBURG	67661	COLT	HRW	73
KS	PHILLIPSBURG	67661	LARNED	HRW	62
KS	PHILLIPSBURG	67661	MUSTANG	HRW	68
KS	PHILLIPSBURG	67661	NEWTON	HRW	66
KS	PHILLIPSBURG	67661	NEWTON	HRW	67

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	PHILLIPSBURG	67661	NEWTON	HRW	74
KS	PHILLIPSBURG	67661	NORKAN	HRW	66
KS	PHILLIPSBURG	67661	THUNDERBIRD	HRW	74
KS	PHILLIPSBURG	67661	VICTORY	HRW	74
KS	PHILLIPSBURG	67661	VICTORY	HRW	83
KS	PRESCOTT	66767	ARKAN	HRW	53
KS	PRESCOTT	66767	ARKAN	HRW	56
KS	PRESCOTT	66767	McNAIR-1003	SRW	25
KS	PRESCOTT	66767	PRO-BRAND-830	HRW	74
KS	PRESCOTT	66767	PRO-BRAND-830	HRW	76
KS	PRESCOTT	66767	TAM-105	HRW	44
KS	PRESCOTT	66767	TAM-105	HRW	54
KS	PRESCOTT	66767	TAM-105	HRW	57
KS	PRESCOTT	66767	TAM-105	HRW	64
KS	PRESCOTT	66767	TAM-108	HRW	49
KS	RYUS	67870	ABILENE	HRW	76
KS	RYUS	67870	GARST-HR48	HRW	73
KS	RYUS	67870	MESA	HRW	71
KS	RYUS	67870	QUANTUM	HRW	60
KS	RYUS	67870	SCOUT	HRW	68
KS	RYUS	67870	STALLION	HRW	70
KS	RYUS	67870	TAM-107	HRW	84
KS	RYUS	67870	VICTORY	HRW	74
KS	SATANTA	67870	HAWK	HRW	77
KS	SATANTA	67870	THUNDERBIRD	HRW	81
KS	SCOTT-CITY	67871	LARNED	HRW	71
KS	SCOTT-CITY	67871	LARNED	HRW	71
KS	SCOTT-CITY	67871	MUSTANG	HRW	63
KS	SCOTT-CITY	67871	STALLION	HRW	66
KS	SEWARD	67577	CENTURK-76	HRW	64
KS	SEWARD	67577	CONCHO	HRW	66
KS	SEWARD	67577	HAWK	HRW	71
KS	SEWARD	67577	NEWTON	HRW	53
KS	SEWARD	67577	NEWTON	HRW	60
KS	SEWARD	67577	NEWTON	HRW	62
KS	SEWARD	67577	NEWTON	HRW	63
KS	SEWARD	67577	TUT	HRW	67
KS	SEWARD	67577	WEATHERMASTER-140A	HRW	68
KS	ST-JOHN	67576	ARKAN	HRW	61
KS	ST-JOHN	67576	HAWK	HRW	62
KS	ST-JOHN	67576	NEWTON	HRW	61
KS	ST-JOHN	67576	TAM-108	HRW	60
KS	ST-JOHN	67576	VICTORY	HRW	69
KS	STANTON-CO	67855	EAGLE	HRW	68
KS	STANTON-CO	67855	HAWK	HRW	64
KS	STANTON-CO	67855	NEWTON	HRW	63
KS	STANTON-CO	67855	SANDY	HRW	73
KS	STANTON-CO	67855	TAM-105	HRW	77
KS	STANTON-CO	67855	TAM-106	HRW	78
KS	STANTON-CO	67855	TAM-107	HRW	68
KS	STANTON-CO	67855	VONA	HRW	72

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	SUBLETTE	67877	ABILENE	HRW	74
KS	SUBLETTE	67877	HAWK	HRW	68
KS	SUBLETTE	67877	HAWK	HRW	73
KS	SUBLETTE	67877	HAWK	HRW	74
KS	SUBLETTE	67877	HAWK	HRW	79
KS	SUBLETTE	67877	MESA	HRW	74
KS	SUBLETTE	67877	TAM-107	HRW	91
KS	SUBLETTE	67877	VICTORY	HRW	77
KS	TAMPA	67483	ARKAN	HRW	49
KS	TAMPA	67483	ARKAN	HRW	60
KS	TAMPA	67483	MUSTANG	HRW	62
KS	TAMPA	67483	NEWTON	HRW	57
KS	TAMPA	67483	NEWTON	HRW	63
KS	TAMPA	67483	PIONEER-2165	HRW	67
KS	TAMPA	67483	PIONEER-5757	HRW	55
KS	TAMPA	67483	PIONEER-5757	HRW	58
KS	TAMPA	67483	VICTORY	HRW	58
KS	TAMPA	67483	VICTORY	HRW	62
KS	WELLINGTON	67152	ARKAN	HRW	68
KS	WELLINGTON	67152	MUSTANG	HRW	56
KS	WELLINGTON	67152	PIONEER-2157	HRW	61
KS	WELLINGTON	67152	PIONEER-2157	HRW	66
KS	WELLINGTON	67152	PIONEER-2172	HRW	75
KS	WELLINGTON	67152	PLAINSMAN	HRW	67
KS	WELLINGTON	67152	STALLION	HRW	63
KS	WELLINGTON	67152	THUNDERBIRD	HRW	76
KS	WELLINGTON	67152	VICTORY	HRW	59
KS	WHITE-CLOUD	66094	AGRI-PRO	HRW	81
KS	WHITE-CLOUD	66094	ARKAN	HRW	62
KS	WHITE-CLOUD	66094	ARKAN	HRW	67
KS	WHITE-CLOUD	66094	NORKAN	HRW	55
KS	WHITE-CLOUD	66094	NORKAN	HRW	69
KS	WHITE-CLOUD	66094	THUNDERBIRD	HRW	79
KS	WHITE-CLOUD	66094	THUNDERBIRD	HRW	80
KS	WHITE-CLOUD	66094	VICTORY	HRW	65
KS	WHITE-CLOUD	66094	VICTORY	HRW	65
KS	WHITE-CLOUD	66094	VICTORY	HRW	70
MN	ARGYLE	56713	MARSHALL	HRS	74
MN	ARGYLE	56713	MARSHALL	HRS	76
MN	ARGYLE	56713	MARSHALL	HRS	79
MN	ARGYLE	56713	MARSHALL	HRS	83
MN	ARGYLE	56713	MARSHALL	HRS	89
MN	ARGYLE	56713	WHEATON	HRS	69
MN	ARGYLE	56713	WHEATON	HRS	76
MN	ARGYLE	56713	WHEATON	HRS	82
MN	ARGYLE	56713	WHEATON	HRS	87
MN	ARGYLE	56713	WHEATON	HRS	90
MN	CYRUS	56323	MARSHALL	HRS	79
MN	CYRUS	56323	PIONEER-2385	HRS	76
MN	CYRUS	56323	PIONEER-2385	HRS	85
MN	CYRUS	56323	WHEATON	HRS	75

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
MN	ELDER	56523	MARSHALL	HRS	75
MN	ELDER	56523	MARSHALL	HRS	77
MN	ELDER	56523	MARSHALL	HRS	81
MN	ELDER	56523	MARSHALL	HRS	83
MN	ELDER	56523	MARSHALL	HRS	83
MN	ELDER	56523	MARSHALL	HRS	85
MN	ELDER	56523	MARSHALL	HRS	86
MN	ELDER	56523	MARSHALL	HRS	87
MN	ELDER	56523	MARSHALL	HRS	94
MN	ELDER	56523	PIONEER	HRW	88
MN	HALLOCK	56728	CELTIC	HRS	81
MN	HALLOCK	56728	MARSHALL	HRS	81
MN	HALLOCK	56728	MARSHALL	HRS	83
MN	HALLOCK	56728	MARSHALL	HRS	83
MN	HALLOCK	56728	MARSHALL	HRS	91
MN	HALLOCK	56728	MARSHALL	HRS	92
MN	HALLOCK	56728	MARSHALL	HRS	97
MN	HALLOCK	56728	PIONEER-2369	HRS	95
MN	HALLOCK	56728	PIONEER-2385	HRS	81
MN	HALLOCK	56728	STOA	HRS	86
MN	HANCOCK	56244	MARSHALL	HRS	70
MN	HANCOCK	56244	MARSHALL	HRS	77
MN	HANCOCK	56244	MARSHALL	HRS	79
MN	HAWLEY	56549	GUARD	HRS	75
MN	HAWLEY	56549	MARSHALL	HRS	70
MN	HAWLEY	56549	MARSHALL	HRS	78
MN	HAWLEY	56549	MARSHALL	HRS	80
MN	HAWLEY	56549	MARSHALL	HRS	80
MN	HAWLEY	56549	MARSHALL	HRS	81
MN	HAWLEY	56549	MARSHALL	HRS	86
MN	HAWLEY	56549	MARSHALL	HRS	89
MN	HAWLEY	56549	STOA	HRS	84
MN	HAWLEY	56549	STOA	HRS	84
MN	KARLSTAD	56732	BUTTE-86	HRS	84
MN	KARLSTAD	56732	BUTTE-86	HRS	86
MN	KARLSTAD	56732	BUTTE-86	HRS	87
MN	KARLSTAD	56732	BUTTE-86	HRS	89
MN	KARLSTAD	56732	MARSHALL	HRS	71
MN	KARLSTAD	56732	MARSHALL	HRS	74
MN	KARLSTAD	56732	MARSHALL	HRS	76
MN	KARLSTAD	56732	MARSHALL	HRS	77
MN	KARLSTAD	56732	TELEMARK	HRS	83
MN	ST-HILAIRE	56554	BUTTE-86	HRS	87
MN	ST-HILAIRE	56554	BUTTE-86	HRS	90
MN	ST-HILAIRE	56554	GUARD	HRS	74
MN	ST-HILAIRE	56554	MARSHALL	HRS	78
MN	ST-HILAIRE	56554	MARSHALL	HRS	86
MN	ST-HILAIRE	56554	MARSHALL	HRS	90
MN	ST-HILAIRE	56554	NK-711	HRS	79
MN	ST-HILAIRE	56554	STOA	HRS	74
MN	ST-HILAIRE	56554	STOA	HRS	77

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
MN	ST-HILAIRE	56554	STOA	HRS	85
MN	WARROAD	56763	MARSHALL	HRS	61
MN	WARROAD	56763	MARSHALL	HRS	64
MN	WARROAD	56763	MARSHALL	HRS	64
MN	WARROAD	56763	MARSHALL	HRS	68
MN	WARROAD	56763	MARSHALL	HRS	70
MN	WARROAD	56763	MARSHALL	HRS	71
MN	WARROAD	56763	MARSHALL	HRS	71
MN	WARROAD	56763	STOA	HRS	64
MN	WARROAD	56763	STOA	HRS	75
MN	WARROAD	56763	STOA	HRS	77
MO	PETTIS-CO	65334	CALDWELL	SRW	14
MO	PETTIS-CO	65334	CALDWELL	SRW	21
MO	PETTIS-CO	65334	PIKE	SRW	13
MO	SALINE-CO	65340	CALDWELL	SRW	27
MO	SALINE-CO	65340	PIKE	SRW	7
MO	SALINE-CO	65340	PIKE	SRW	13
MO	SALINE-CO	65340	PIKE	SRW	14
MO	SALINE-CO	65340	PIKE	SRW	15
MO	TRENTON	64683	CALDWELL	SRW	25
MO	TRENTON	64683	CALDWELL	SRW	30
MO	TRENTON	64683	CALDWELL	SRW	30
MO	TRENTON	64683	CALDWELL	SRW	31
MO	TRENTON	64683	CALDWELL	SRW	32
MO	TRENTON	64683	CALDWELL	SRW	32
MO	TRENTON	64683	GENIE-II	SRW	29
MO	TRENTON	64683	PIKE	SRW	19
MO	TRENTON	64683	PIKE	SRW	21
MO	WAYLAND	63472	AUBURN	SRW	33
MO	WAYLAND	63472	CALDWELL	SRW	32
MT	BROADVIEW	59015	CREE	HRW	63
MT	CHOTEAU	59422	SOLAR-DNS	HRS	82
MT	DODSON	59524	GLENMAN	HRS	63
MT	DODSON	59524	GUERT-2	HRW	64
MT	DODSON	59524	NEWANA	HRS	71
MT	DODSON	59524	NORSTAR	HRW	64
MT	DUTTON	59433	FORTUNA	HRS	81
MT	DUTTON	59433	GLENMAN	HRS	81
MT	GREAT-FALLS	59404	NEWANA	HRS	72
MT	GREAT-FALLS	59404	NEWANA	HRS	78
MT	PLENTYWOOD	59254	BUTTE-86	HRS	88
MT	PLENTYWOOD	59254	CUTLESS	HRS	81
MT	SHELBY	59474	GLENMAN	HRS	81
MT	THREE-FORKS	59752	BRONZE-CHIEF	HRS	72
MT	THREE-FORKS	59752	NEWANA	HRS	79
MT	THREE-FORKS	59752	REDWIN	HRW	82
ND	ALSEN	58311	BUTTE-86	HRS	90
ND	ALSEN	58311	MARSHALL	HRS	81
ND	ALSEN	58311	NORSEMAN	HRS	104
ND	ALSEN	58311	PIONEER-2369	HRS	90
ND	ALSEN	58311	PIONEER-2385	HRS	81

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
ND	ALSEN	58311	STOA	HRS	89
ND	BEULAH	58523	ALEX	HRS	83
ND	BEULAH	58523	ALEX	HRS	85
ND	BEULAH	58523	ALEX	HRS	92
ND	BEULAH	58523	COTEAU	HRS	89
ND	BEULAH	58523	MARSHALL	HRS	85
ND	BEULAH	58523	MARSHALL	HRS	89
ND	BEULAH	58523	STOA	HRS	86
ND	BEULAH	58523	STOA	HRS	90
ND	BEULAH	58523	WHEATON	HRS	76
ND	BINFORD	58416	BUTTE	HRS	96
ND	BINFORD	58416	BUTTE-86	HRS	76
ND	BINFORD	58416	BUTTE-86	HRS	90
ND	BINFORD	58416	COLUMBUS	HRS	71
ND	BINFORD	58416	COLUMBUS	HRS	84
ND	BINFORD	58416	LEN	HRS	73
ND	BINFORD	58416	LEN	HRS	81
ND	BINFORD	58416	LEN	HRS	82
ND	BINFORD	58416	LEN	HRS	90
ND	CARRINGTON	58421	BUTTE-86	HRS	80
ND	CARRINGTON	58421	BUTTE-86	HRS	84
ND	CARRINGTON	58421	BUTTE-86	HRS	90
ND	CARRINGTON	58421	BUTTE-86	HRS	93
ND	CARRINGTON	58421	BUTTE-86	HRS	93
ND	CARRINGTON	58421	BUTTE-86	HRS	95
ND	CARRINGTON	58421	COLUMBUS	HRS	87
ND	CARRINGTON	58421	COLUMBUS	HRS	88
ND	CARRINGTON	58421	LEN	HRS	87
ND	CARRINGTON	58421	LEN	HRS	90
ND	CARSON	58529	COTEAU	HRS	91
ND	COLFAX	58018	APEX	HRS	69
ND	COLFAX	58018	BUTTE-86	HRS	88
ND	COLFAX	58018	BUTTE-86	HRS	93
ND	COLFAX	58018	BUTTE-86	HRS	96
ND	COLFAX	58018	LEN	HRS	83
ND	COLFAX	58018	MARSHALL	HRS	82
ND	COLFAX	58018	PIONEER-17707	HRS	97
ND	COLFAX	58018	PIONEER-2385	HRS	86
ND	FLASHER	58535	COTEAU	HRS	91
ND	FORMAN	58032	BUTTE-86	HRS	85
ND	FORMAN	58032	BUTTE-86	HRS	95
ND	FORMAN	58032	STOA	HRS	77
ND	GRAFTON	58237	BUTTE-86	HRS	69
ND	GRAFTON	58237	BUTTE-86	HRS	78
ND	GRAFTON	58237	MARSHALL	HRS	97
ND	GRAFTON	58237	NORSEMAN	HRS	68
ND	GRAFTON	58237	NORSEMAN	HRS	96
ND	GRAFTON	58237	NORSEMAN	HRS	103
ND	GRAFTON	58237	STOA	HRS	84
ND	GRAFTON	58237	STOA	HRS	91
ND	GRAFTON	58237	TELEMARK	HRS	90

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
ND	GWINNER	58040	LEN	HRS	88
ND	GWINNER	58040	STOA	HRS	94
ND	HUNTER	58048	BUTTE-86	HRS	83
ND	HUNTER	58048	BUTTE-86	HRS	94
ND	HUNTER	58048	BUTTE-86	HRS	97
ND	HUNTER	58048	MARSHALL	HRS	71
ND	HUNTER	58048	MARSHALL	HRS	80
ND	HUNTER	58048	STOA	HRS	79
ND	HUNTER	58048	STOA	HRS	84
ND	HUNTER	58048	STOA	HRS	87
ND	HUNTER	58048	STOA	HRS	93
ND	JAMESTOWN	58401	BUTTE-86	HRS	88
ND	JAMESTOWN	58401	LEN	HRS	82
ND	JAMESTOWN	58401	PIONEER-2385	HRS	81
ND	JAMESTOWN	58401	STOA	HRS	82
ND	LARIMORE	58251	BUTTE-86	HRS	82
ND	LARIMORE	58251	CELTIC	HRS	80
ND	LARIMORE	58251	MARSHALL	HRS	71
ND	LARIMORE	58251	MARSHALL	HRS	76
ND	LARIMORE	58251	MARSHALL	HRS	78
ND	LARIMORE	58251	MARSHALL	HRS	81
ND	LARIMORE	58251	PIONEER-2369	HRS	90
ND	LARIMORE	58251	STOA	HRS	83
ND	LARK	58535	LEN	HRS	82
ND	LISBON	58054	STOA	HRS	77
ND	NECHE	58265	BUTTE-86	HRS	91
ND	NECHE	58265	BUTTE-86	HRS	94
ND	NECHE	58265	BUTTE-86	HRS	98
ND	NECHE	58265	MARSHALL	HRS	86
ND	NECHE	58265	MARSHALL	HRS	87
ND	NECHE	58265	MARSHALL	HRS	89
ND	NECHE	58265	STOA	HRS	87
ND	NECHE	58265	STOA	HRS	93
ND	RALEIGH	58564	906-R	HRS	74
ND	RALEIGH	58564	COTEAU	HRS	81
ND	RALEIGH	58564	LEN	HRS	83
ND	RALEIGH	58564	STOA	HRS	70
ND	RALEIGH	58564	STOA	HRS	76
ND	RALEIGH	58564	STOA	HRS	79
ND	RALEIGH	58564	STOA	HRS	79
ND	REGAN	58477	COTEAU	HRS	82
ND	REGAN	58477	COTEAU	HRS	86
ND	REGAN	58477	COTEAU	HRS	87
ND	REGAN	58477	COTEAU	HRS	96
ND	REGAN	58477	LEN	HRS	83
ND	REGAN	58477	LEN	HRS	85
ND	REGAN	58477	LEN	HRS	85
ND	REGAN	58477	LEN	HRS	92
ND	REGAN	58477	STOA	HRS	81
ND	REGAN	58477	STOA	HRS	85
ND	STIRUM	58069	BUTTE-86	HRS	95

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
ND	STIRUM	58069	LEN	HRS	90
ND	TOLLEY	58787	ALEX	HRS	86
ND	TOLLEY	58787	BUTTE-86	HRS	92
ND	TOLLEY	58787	COLUMBUS	HRS	103
ND	TOLLEY	58787	COTEAU	HRS	93
ND	TOLLEY	58787	COTEAU	HRS	94
ND	TOLLEY	58787	LEN	HRS	83
ND	TOLLEY	58787	LEN	HRS	86
ND	TOLLEY	58787	PIONEER	HRW	89
ND	TOLLEY	58787	STOA	HRS	86
ND	TOLLEY	58787	STOA	HRS	89
ND	WYNDMERE	58081	WALDRON	HRS	95
NE	ALLIANCE	69301	BUCKSKIN	HRW	72
NE	ALLIANCE	69301	BUCKSKIN	HRW	72
NE	ALLIANCE	69301	CENTURA	HRW	51
NE	ALLIANCE	69301	CENTURA	HRW	53
NE	ALLIANCE	69301	CENTURA	HRW	55
NE	ALLIANCE	69301	COLT	HRW	46
NE	ALLIANCE	69301	COLT	HRW	46
NE	ALLIANCE	69301	COLT	HRW	47
NE	ALLIANCE	69301	VONA	HRW	62
NE	ALLIANCE	69301	VONA	HRW	63
NE	CHAPPELL	69129	BRULE	HRW	54
NE	CHAPPELL	69129	BRULE	HRW	55
NE	CHAPPELL	69129	BRULE	HRW	56
NE	CHAPPELL	69129	CENTURA	HRW	59
NE	CHAPPELL	69129	CENTURA	HRW	59
NE	CHAPPELL	69129	CENTURA	HRW	71
NE	CHAPPELL	69129	CODY	HRW	51
NE	CHAPPELL	69129	COLT	HRW	48
NE	CHAPPELL	69129	SIOUXLAND	HRW	59
NE	CHAPPELL	69129	VONA	HRW	53
NE	DALTON	69131	HAWK	HRW	68
NE	DIX	69133	CENTURA	HRW	56
NE	DIX	69133	CENTURK-78	HRW	70
NE	DIX	69133	SCOUT	HRW	57
NE	DIX	69133	SIOUXLAND	HRW	63
NE	GORDON	69343	BRULE	HRW	61
NE	GORDON	69343	CENTURA	HRW	64
NE	GORDON	69343	CODY	HRW	45
NE	GORDON	69343	HAWK	HRW	52
NE	GORDON	69343	HAWK	HRW	54
NE	GORDON	69343	SAGE	HRW	43
NE	GORDON	69343	SCOUT-66	HRW	49
NE	GORDON	69343	SCOUT-66	HRW	51
NE	GORDON	69343	SCOUT-66	HRW	58
NE	GORDON	69343	SCOUT-66	HRW	62
NE	GORDON	69343	SIOUXLAND	HRW	45
NE	GORDON	69343	SIOUXLAND	HRW	46
NE	GORDON	69343	SIOUXLAND	HRW	56
NE	GORDON	69343	SIOUXLAND	HRW	59

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
NE	GORDON	69343	THUNDERBIRD	HRW	64
NE	GORDON	69343	THUNDERBIRD	HRW	65
NE	GORDON	69343	VONA	HRW	65
NE	GURLEY	69141	BRULE	HRW	55
NE	GURLEY	69141	BRULE	HRW	69
NE	GURLEY	69141	CENTURA	HRW	62
NE	GURLEY	69141	CENTURA	HRW	63
NE	GURLEY	69141	CENTURA	HRW	72
NE	GURLEY	69141	CENTURA	HRW	73
NE	GURLEY	69141	CENTURA	HRW	79
NE	GURLEY	69141	CENTURK	HRW	57
NE	GURLEY	69141	CENTURK-78	HRW	64
NE	GURLEY	69141	HAWK	HRW	58
NE	GURLEY	69141	HAWK	HRW	70
NE	GURLEY	69141	REDLAND	HRW	62
NE	GURLEY	69141	REDLAND	HRW	64
NE	HEMINGFORD	69348	BRULE	HRW	58
NE	HEMINGFORD	69348	BUCKSKIN	HRW	70
NE	HEMINGFORD	69348	CENTURA	HRW	73
NE	HEMINGFORD	69348	CODY	HRW	69
NE	HEMINGFORD	69348	COLT	HRW	59
NE	HEMINGFORD	69348	LANCER	HRW	78
NE	HEMINGFORD	69348	REDLAND	HRW	69
NE	HEMINGFORD	69348	SIOUXLAND	HRW	75
NE	HEMINGFORD	69348	TAM-107	HRW	78
NE	HEMINGFORD	69348	VONA	HRW	69
NE	KIMBALL	69145	BRULE	HRW	69
NE	KIMBALL	69145	BUCKSKIN	HRW	68
NE	KIMBALL	69145	CENTURA	HRW	73
NE	KIMBALL	69145	CENTURK	HRW	76
NE	KIMBALL	69145	CODY	HRW	62
NE	KIMBALL	69145	SCOUT-66	HRW	63
NE	SIDNEY	69162	BRULE	HRW	59
NE	SIDNEY	69162	BRULE	HRW	63
NE	SIDNEY	69162	BRULE	HRW	64
NE	SIDNEY	69162	CENTURA	HRW	64
NE	SIDNEY	69162	CENTURK	HRW	54
NE	SIDNEY	69162	CENTURK-78	HRW	73
NE	SIDNEY	69162	COLT	HRW	47
NE	SIDNEY	69162	COLT	HRW	58
NE	SIDNEY	69162	HAWK	HRW	66
NE	SIDNEY	69162	LANCER	HRW	71
NE	SIDNEY	69162	ROCKY	HRW	76
NE	SIDNEY	69162	SIOUXLAND	HRW	61
NE	SIDNEY	69162	SIOUXLAND	HRW	64
NE	SIDNEY	69162	SIOUXLAND	HRW	65
NE	VENANGO	69168	CENTURA	HRW	64
NE	VENANGO	69168	CENTURA	HRW	66
NE	VENANGO	69168	CHEYENNE	HRW	61
NE	VENANGO	69168	CODY	HRW	60
NE	VENANGO	69168	COLT	HRW	62

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDN
NE	VENANGO	69168	NORKAN	HRW	59
NE	VENANGO	69168	REDLAND	HRW	47
NE	VENANGO	69168	TAM-107	HRW	73
NE	VENANGO	69168	TAM-107	HRW	77
NE	VENANGO	69168	TAM-107	HRW	81
OH	BUTLER	44822	CALDWELL	SRW	25
OH	BUTLER	44822	CALDWELL	SRW	27
OH	BUTLER	44822	PIONEER	SRW	20
OH	COLUMBUS	43201	BECKER	SRW	23
OH	COLUMBUS	43201	HART	SRW	30
OH	COLUMBUS	43201	TITAN	SRW	30
OH	CROTON	43013	CALDWELL	SRW	22
OH	DELAWARE	43015	PIONEER-2550	SRW	22
OH	LANCASTER	43130	SCOTTY	SRW	28
OH	MAHONING	44609	LOGAN	SRW	26
OH	NEWARK	43093	CALDWELL	SRW	29
OH	PATASKALA	43062	CALDWELL	SRW	29
OH	PICKERINGTON	43147	BECKER	SRW	17
OH	PLEASANTVILLE	43148	PIONEER	SRW	32
OH	PORTAGE	43451	LOGAN	SRW	24
OH	PORTAGE	43451	PIONEER	SRW	23
OH	PREBLE	45347	CARDINAL	SRW	22
OH	PREBLE	45347	CARDINAL	SRW	24
OH	S-CHARLESTON	45368	40A-DYNASTY	SRW	22
OH	S-CHARLESTON	45368	BECKER	SRW	20
OH	S-CHARLESTON	45368	BECKER	SRW	21
OH	S-CHARLESTON	45368	CALDWELL	SRW	26
OH	S-CHARLESTON	45368	CALDWELL	SRW	28
OH	S-CHARLESTON	45368	CALDWELL	SRW	31
OH	S-CHARLESTON	45368	CARDINAL	SRW	21
OH	S-CHARLESTON	45368	CARDINAL	SRW	23
OH	S-CHARLESTON	45368	DYNASTY	SRW	23
OH	S-CHARLESTON	45368	FS402	SRW	25
OH	S-CHARLESTON	45368	FS402	SRW	25
OH	S-CHARLESTON	45368	GR860	SRW	25
OH	S-CHARLESTON	45368	GR860	SRW	25
OH	S-CHARLESTON	45368	GR876	SRW	26
OH	S-CHARLESTON	45368	GR876	SRW	30
OH	WINCHESTER	45697	BECKER	SRW	24
OK	AFTON	74331	ARKAN	HRW	59
OK	AFTON	74331	CALDWELL	SRW	32
OK	AFTON	74331	CHISHOLM	HRW	44
OK	AFTON	74331	CHISHOLM	HRW	45
OK	AFTON	74331	CHISHOLM	HRW	45
OK	AFTON	74331	CHISHOLM	HRW	49
OK	AFTON	74331	CHISHOLM	HRW	49
OK	AFTON	74331	CHISHOLM	HRW	50
OK	AFTON	74331	CHISHOLM	HRW	52
OK	AFTON	74331	CHISHOLM	HRW	52
OK	AFTON	74331	CHISHOLM	HRW	56
OK	AFTON	74331	CHISHOLM	HRW	64

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
OK	AFTON	74331	PIONEER	HRW	66
OK	AFTON	74331	PIONEER	HRW	72
OK	AFTON	74331	PIONEER-2157	HRW	50
OK	AFTON	74331	PIONEER-2157	HRW	51
OK	AFTON	74331	WRANGLER	HRW	63
OK	AFTON	74331	WRANGLER	HRW	66
OK	BISON	73720	CHISHOLM	HRW	36
OK	BISON	73720	CHISHOLM	HRW	40
OK	BISON	73720	CHISHOLM	HRW	41
OK	BISON	73720	CHISHOLM	HRW	41
OK	BISON	73720	CHISHOLM	HRW	43
OK	BISON	73720	CHISHOLM	HRW	43
OK	BISON	73720	CHISHOLM	HRW	44
OK	BISON	73720	CHISHOLM	HRW	44
OK	BISON	73720	CHISHOLM	HRW	46
OK	BISON	73720	CHISHOLM	HRW	48
OK	BISON	73720	PIONEER-2157	HRW	60
OK	BISON	73720	PIONEER-2157	HRW	60
OK	BISON	73720	PIONEER-2157	HRW	64
OK	BISON	73720	PIONEER-2157	HRW	66
OK	BISON	73720	PIONEER-2157	HRW	67
OK	BISON	73720	TRIUMPH	HRW	47
OK	BISON	73720	TRIUMPH	HRW	52
OK	BISON	73720	TRIUMPH	HRW	53
OK	BISON	73720	TRIUMPH	HRW	54
OK	BISON	73720	TRIUMPH	HRW	56
OK	CHICKASHA	73015	CHISHOLM	HRW	41
OK	CHICKASHA	73015	CHISHOLM	HRW	43
OK	CHICKASHA	73015	CHISHOLM	HRW	43
OK	CHICKASHA	73015	CHISHOLM	HRW	45
OK	CHICKASHA	73015	CHISHOLM	HRW	47
OK	CHICKASHA	73015	CHISHOLM	HRW	47
OK	CHICKASHA	73015	CHISHOLM	HRW	47
OK	CHICKASHA	73015	CHISHOLM	HRW	48
OK	CHICKASHA	73015	CHISHOLM	HRW	50
OK	CHICKASHA	73015	CHISHOLM	HRW	52
OK	CHICKASHA	73015	PIONEER-2157	HRW	54
OK	CHICKASHA	73015	PIONEER-2157	HRW	58
OK	CHICKASHA	73015	PIONEER-2157	HRW	58
OK	CHICKASHA	73015	PIONEER-2157	HRW	62
OK	CHICKASHA	73015	PIONEER-2157	HRW	64
OK	CHICKASHA	73015	VONA	HRW	46
OK	CHICKASHA	73015	VONA	HRW	50
OK	CHICKASHA	73015	VONA	HRW	55
OK	CHICKASHA	73015	VONA	HRW	57
OK	CHICKASHA	73015	VONA	HRW	60
OK	CHICKASHA	73015	VONA	HRW	40
OK	FREDERICK	73542	CHISHOLM	HRW	41
OK	FREDERICK	73542	CHISHOLM	HRW	43
OK	FREDERICK	73542	CHISHOLM	HRW	43
OK	FREDERICK	73542	CHISHOLM	HRW	44
OK	FREDERICK	73542	CHISHOLM	HRW	44

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
OK	FREDERICK	73542	CHISHOLM	HRW	44
OK	FREDERICK	73542	CHISHOLM	HRW	44
OK	FREDERICK	73542	CHISHOLM	HRW	44
OK	FREDERICK	73542	NK-812	HRW	79
OK	FREDERICK	73542	NK-812	HRW	85
OK	KINGFISHER	73750	CHISHOLM	HRW	35
OK	KINGFISHER	73750	CHISHOLM	HRW	38
OK	KINGFISHER	73750	CHISHOLM	HRW	38
OK	KINGFISHER	73750	CHISHOLM	HRW	41
OK	KINGFISHER	73750	CHISHOLM	HRW	42
OK	KINGFISHER	73750	CHISHOLM	HRW	44
OK	KINGFISHER	73750	CHISHOLM	HRW	44
OK	KINGFISHER	73750	CHISHOLM	HRW	45
OK	KINGFISHER	73750	CHISHOLM	HRW	50
OK	KINGFISHER	73750	CHISHOLM	HRW	59
OK	KINGFISHER	73750	PIONEER	HRW	61
OK	KINGFISHER	73750	PIONEER	HRW	61
OK	KINGFISHER	73750	PIONEER-2157	HRW	58
OK	KINGFISHER	73750	PIONEER-2157	HRW	61
OK	KINGFISHER	73750	PIONEER-2157	HRW	61
OK	KINGFISHER	73750	TAM-101	HRW	58
OK	KINGFISHER	73750	TAM-101	HRW	58
OK	KINGFISHER	73750	TAM-101	HRW	63
OK	KINGFISHER	73750	TRIUMPH	HRW	55
OK	MEDFORD	73759	CHISHOLM	HRW	42
OK	MEDFORD	73759	CHISHOLM	HRW	45
OK	MEDFORD	73759	CHISHOLM	HRW	48
OK	MEDFORD	73759	PIONEER-2157	HRW	50
OK	MEDFORD	73759	PIONEER-2157	HRW	57
OK	MEDFORD	73759	PIONEER-2157	HRW	57
OK	MEDFORD	73759	PIONEER-2157	HRW	60
OK	MEDFORD	73759	PIONEER-2157	HRW	64
OK	MEDFORD	73759	PIONEER-2157	HRW	66
OK	MEDFORD	73759	STALLION	HRW	65
OK	PONCA-CITY	74601	CHISHOLM	HRW	36
OK	PONCA-CITY	74601	CHISHOLM	HRW	40
OK	PONCA-CITY	74601	CHISHOLM	HRW	40
OK	PONCA-CITY	74601	CHISHOLM	HRW	41
OK	PONCA-CITY	74601	CHISHOLM	HRW	41
OK	PONCA-CITY	74601	CHISHOLM	HRW	42
OK	PONCA-CITY	74601	CHISHOLM	HRW	43
OK	PONCA-CITY	74601	CHISHOLM	HRW	44
OK	PONCA-CITY	74601	CHISHOLM	HRW	48
OK	PONCA-CITY	74601	CHISHOLM	HRW	51
OK	PONCA-CITY	74601	MUSTANG	HRW	60
OK	PONCA-CITY	74601	MUSTANG	HRW	65
OK	PONCA-CITY	74601	MUSTANG	HRW	66
OK	PONCA-CITY	74601	MUSTANG	HRW	66
OK	PONCA-CITY	74601	PIONEER	HRW	49
OK	PONCA-CITY	74601	PIONEER	HRW	58
OK	PONCA-CITY	74601	PIONEER-2157	HRW	54

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
OK	PONCA-CITY	74601	PIONEER-2157	HRW	60
OK	PONCA-CITY	74601	PIONEER-2157	HRW	61
OK	PONCA-CITY	74601	PIONEER-2157	HRW	63
OK	STILLWATER	74076	CHISHOLM	HRW	33
OK	STILLWATER	74076	CHISHOLM	HRW	38
OK	STILLWATER	74076	CHISHOLM	HRW	40
OK	STILLWATER	74076	CHISHOLM	HRW	42
OK	STILLWATER	74076	CHISHOLM	HRW	42
OK	STILLWATER	74076	CHISHOLM	HRW	43
OK	STILLWATER	74076	CHISHOLM	HRW	43
OK	STILLWATER	74076	CHISHOLM	HRW	44
OK	STILLWATER	74076	CHISHOLM	HRW	50
OK	STILLWATER	74076	CHISHOLM	HRW	67
OK	STILLWATER	74076	CONCHO	HRW	36
OK	STILLWATER	74076	CONCHO	HRW	39
OK	STILLWATER	74076	CONCHO	HRW	39
OK	STILLWATER	74076	CONCHO	HRW	40
OK	STILLWATER	74076	CONCHO	HRW	40
OK	STILLWATER	74076	PIONEER-2157	HRW	56
OK	STILLWATER	74076	PIONEER-2157	HRW	60
OK	STILLWATER	74076	PIONEER-2157	HRW	61
OK	STILLWATER	74076	PIONEER-2157	HRW	62
OK	STILLWATER	74076	PIONEER-2157	HRW	62
OK	WEATHERFORD	73096	CHISHOLM	HRW	40
OK	WEATHERFORD	73096	CHISHOLM	HRW	42
OK	WEATHERFORD	73096	CHISHOLM	HRW	43
OK	WEATHERFORD	73096	CHISHOLM	HRW	43
OK	WEATHERFORD	73096	CHISHOLM	HRW	47
OK	WEATHERFORD	73096	CHISHOLM	HRW	50
OK	WEATHERFORD	73096	CHISHOLM	HRW	51
OK	WEATHERFORD	73096	CHISHOLM	HRW	51
OK	WEATHERFORD	73096	CHISHOLM	HRW	52
OK	WEATHERFORD	73096	CHISHOLM	HRW	53
OK	WEATHERFORD	73096	MUSTANG	HRW	52
OK	WEATHERFORD	73096	MUSTANG	HRW	61
OK	WEATHERFORD	73096	PIONEER-2157	HRW	47
OK	WEATHERFORD	73096	PIONEER-2157	HRW	58
OK	WEATHERFORD	73096	PIONEER-2157	HRW	64
OK	WEATHERFORD	73096	PIONEER-2157	HRW	66
OK	WEATHERFORD	73096	PIONEER-2157	HRW	69
OK	WEATHERFORD	73096	TRIUMPH	HRW	46
OK	WEATHERFORD	73096	TRIUMPH	HRW	51
OK	WEATHERFORD	73096	TRIUMPH	HRW	54
OK	WOODWARD	73801	CHISHOLM	HRW	34
OK	WOODWARD	73801	CHISHOLM	HRW	40
OK	WOODWARD	73801	CHISHOLM	HRW	41
OK	WOODWARD	73801	CHISHOLM	HRW	49
OK	WOODWARD	73801	CHISHOLM	HRW	60
OK	WOODWARD	73801	CHISHOLM	HRW	71
OK	WOODWARD	73801	PIONEER-2157	HRW	49
OK	WOODWARD	73801	PIONEER-2157	HRW	54

TABLE 1. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
OK	WOODWARD	73801	PIONEER-2157	HRW	58
OK	WOODWARD	73801	PIONEER-2157	HRW	62
OK	WOODWARD	73801	PIONEER-2157	HRW	72
OK	WOODWARD	73801	SIOUXLAND	HRW	59
OK	WOODWARD	73801	SIOUXLAND	HRW	59
OK	WOODWARD	73801	SIOUXLAND	HRW	60
OK	WOODWARD	73801	SIOUXLAND	HRW	67
OK	WOODWARD	73802	CHISHOLM	HRW	40
OK	WOODWARD	73802	CHISHOLM	HRW	43
OK	WOODWARD	73802	CHISHOLM	HRW	44
OK	WOODWARD	73802	CHISHOLM	HRW	58
OK	WOODWARD	73802	SIOUXLAND	HRW	64

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	ALTA-VISTA	66834	ARKAN	HRW	61
KS	ALTA-VISTA	66834	NORKAN	HRW	64
KS	ARKANSAS-CITY	67005	ARKAN	HRW	60
KS	ARKANSAS-CITY	67005	ARKAN	HRW	67
KS	BELLE-PLAINE	67013	MESA	HRW	59
KS	BELLE-PLAINE	67013	MESA	HRW	62
KS	BELLE-PLAINE	67013	VICTORY	HRW	57
KS	BELOIT	67420	ARKAN	HRW	66
KS	BELOIT	67420	NORKAN	HRW	65
KS	BELVUE	66407	TAM-107	HRW	81
KS	BISON	67520	MESA	HRW	76
KS	BONNER-SPRINGS	66012	ARKAN	HRW	63
KS	BONNER-SPRINGS	66012	ARKAN	HRW	64
KS	BONNER-SPRINGS	66012	DODGE	HRW	68
KS	BONNER-SPRINGS	66012	NEWTON	HRW	58
KS	BONNER-SPRINGS	66012	NEWTON	HRW	60
KS	BROWN-CO	66434	ABILENE-DRYLAND	HRW	63
KS	BROWN-CO	66434	ARKAN-DRYLAND	HRW	50
KS	BROWN-CO	66434	BH-122-DRYLAND	HRW	55
KS	BROWN-CO	66434	BH-203A-DRYLAND	HRW	38
KS	BROWN-CO	66434	CALDWELL-DRYLAND	SRW	25
KS	BROWN-CO	66434	CENTURA-DRYLAND	HRW	62
KS	BROWN-CO	66434	CENTURY-DRYLAND	HRW	61
KS	BROWN-CO	66434	CHISHOLM-DRYLAND	HRW	42
KS	BROWN-CO	66434	COLT-DRYLAND	HRW	51
KS	BROWN-CO	66434	COMPTON-DRYLAND	SRW	20
KS	BROWN-CO	66434	DELANGE-7837-DRYLAND	HRW	52
KS	BROWN-CO	66434	DELANGE-7846-DRYLAND	HRW	50
KS	BROWN-CO	66434	DODGE-DRYLAND	HRW	54
KS	BROWN-CO	66434	KARL-DRYLAND	HRW	56
KS	BROWN-CO	66434	LARNED-DRYLAND	HRW	61
KS	BROWN-CO	66434	MESA-DRYLAND	HRW	68
KS	BROWN-CO	66434	MO-9965-EVD-DRYLAND	SRW	

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNE
KS	BROWN-CO	66434	W85-120-EXP-DRYLAND	HRW	64
KS	BURDETT	67523	TAM-107	HRW	71
KS	BURLINGAME	66413	NORKAN	HRW	64
KS	BURLINGAME	66413	SIOUXLAND	HRW	60
KS	CANEY	67333	ARKAN	HRW	56
KS	CHASE	67524	MESA	HRW	69
KS	CIMMERON	67835	LARNED	HRW	69
KS	CIMMERON	67835	NEWTON	HRW	70
KS	DELIA	66418	ARKAN	HRW	62
KS	DERBY	67037	THUNDERBIRD	HRW	60
KS	ELLIS-CO	67601	ABILENE-DRYLAND	HRW	67
KS	ELLIS-CO	67601	ARKAN-DRYLAND	HRW	65
KS	ELLIS-CO	67601	CHISHOLM-DRYLAND	HRW	42
KS	ELLIS-CO	67601	CODY-DRYLAND	HRW	77
KS	ELLIS-CO	67601	DELANGE-7837-DRYLAND	HRW	61
KS	ELLIS-CO	67601	DODGE-DRYLAND	HRW	78
KS	ELLIS-CO	67601	KS84HW196-EXP-DRYLAND	HRW	63
KS	ELLIS-CO	67601	MESA-DRYLAND	HRW	75
KS	ELLIS-CO	67601	MUSTANG-DRYLAND	HRW	69
KS	ELLIS-CO	67601	NEWTON-DRYLAND	HRW	63
KS	ELLIS-CO	67601	NORKAN-DRYLAND	HRW	68
KS	ELLIS-CO	67601	PIONEER-2154-DRYLAND	HRW	81
KS	ELLIS-CO	67601	PIONEER-2157-DRYLAND	HRW	59
KS	ELLIS-CO	67601	PIONEER-2172-DRYLAND	HRW	79
KS	ELLIS-CO	67601	QUANTUM-562-DRYLAND	HRW	63
KS	ELLIS-CO	67601	RIO-BLANCO-DRYLAND	HRW	63
KS	ELLIS-CO	67601	SIOUXLAND-DRYLAND	HRW	69
KS	ELLIS-CO	67601	TAM-105-DRYLAND	HRW	69
KS	ELLIS-CO	67601	TAM-107-DRYLAND	HRW	73
KS	ELLIS-CO	67601	TAM-108-DRYLAND	HRW	67
KS	ELLIS-CO	67601	TAM-200-DRYLAND	HRW	60
KS	ELLIS-CO	67601	THUNDERBIRD-DRYLAND	HRW	80
KS	ELLIS-CO	67601	VICTORY-DRYLAND	HRW	67
KS	EVEREST	66424	ABILENE	HRW	70
KS	EVEREST	66424	ABILENE	HRW	71
KS	FINNEY-CO	67846	ABILENE-DRYLAND	HRW	71
KS	FINNEY-CO	67846	ABILENE-IRRIGATED	HRW	60
KS	FINNEY-CO	67846	ARKAN-DRYLAND	HRW	61
KS	FINNEY-CO	67846	ARKAN-IRRIGATED	HRW	64
KS	FINNEY-CO	67846	BH-122-DRYLAND	HRW	60
KS	FINNEY-CO	67846	BH-122-IRRIGATED	HRW	55
KS	FINNEY-CO	67846	BH-203A-DRYLAND	HRW	44
KS	FINNEY-CO	67846	BH-203A-IRRIGATED	HRW	47
KS	FINNEY-CO	67846	BRONCO-DRYLAND	HRW	62
KS	FINNEY-CO	67846	CENTURY-DRYLAND	HRW	71
KS	FINNEY-CO	67846	CENTURY-IRRIGATED	HRW	62
KS	FINNEY-CO	67846	CHISHOLM-DRYLAND	HRW	46
KS	FINNEY-CO	67846	DELANGE-7837-DRYLAND	HRW	72
KS	FINNEY-CO	67846	DELANGE-7846-DRYLAND	HRW	61
KS	FINNEY-CO	67846	DODGE-DRYLAND	HRW	69
KS	FINNEY-CO	67846	DODGE-IRRIGATED	HRW	66

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	FINNEY-CO	67846	KARL-DRYLAND	HRW	73
KS	FINNEY-CO	67846	KARL-IRRIGATED	HRW	63
KS	FINNEY-CO	67846	KS84HW196-EXP-DRYLAND	HWW	62
KS	FINNEY-CO	67846	KS84HW196-EXP-IRRIGATED	HWW	68
KS	FINNEY-CO	67846	LARNED-DRYLAND	HRW	67
KS	FINNEY-CO	67846	MUSTANG-DRYLAND	HRW	62
KS	FINNEY-CO	67846	MUSTANG-IRRIGATED	HRW	62
KS	FINNEY-CO	67846	NEWTON-DRYLAND	HRW	63
KS	FINNEY-CO	67846	NEWTON-IRRIGATED	HRW	54
KS	FINNEY-CO	67846	NORKAN-DRYLAND	HRW	64
KS	FINNEY-CO	67846	NORKAN-IRRIGATED	HRW	61
KS	FINNEY-CO	67846	PIONEER-2154-DRYLAND	HRW	77
KS	FINNEY-CO	67846	PIONEER-2157-IRRIGATED	HRW	58
KS	FINNEY-CO	67846	PIONEER-2172-DRYLAND	HRW	74
KS	FINNEY-CO	67846	PIONEER-2172-IRRIGATED	HRW	75
KS	FINNEY-CO	67846	QUANTUM-578-DRYLAND	HRW	64
KS	FINNEY-CO	67846	QUANTUM-578-IRRIGATED	HRW	57
KS	FINNEY-CO	67846	REDLAND-DRYLAND	HRW	64
KS	FINNEY-CO	67846	RIO-BLANCO-DRYLAND	HWW	62
KS	FINNEY-CO	67846	RIO-BLANCO-IRRIGATED	HWW	59
KS	FINNEY-CO	67846	SCOUT-66-DRYLAND	HRW	69
KS	FINNEY-CO	67846	SIOUXLAND-DRYLAND	HRW	73
KS	FINNEY-CO	67846	SIOUXLAND-IRRIGATED	HRW	62
KS	FINNEY-CO	67846	STALLION-IRRIGATED	HRW	61
KS	FINNEY-CO	67846	STAR-SEED-830-IRRIGATED	HRW	73
KS	FINNEY-CO	67846	TAM-105-DRYLAND	HRW	76
KS	FINNEY-CO	67846	TAM-105-IRRIGATED	HRW	66
KS	FINNEY-CO	67846	TAM-107-DRYLAND	HRW	74
KS	FINNEY-CO	67846	TAM-107-IRRIGATED	HRW	69
KS	FINNEY-CO	67846	TAM-108-DRYLAND	HRW	59
KS	FINNEY-CO	67846	TAM-108-IRRIGATED	HRW	47
KS	FINNEY-CO	67846	TAM-200-IRRIGATED	HRW	59
KS	FINNEY-CO	67846	THUNDERBIRD-DRYLAND	HRW	71
KS	FINNEY-CO	67846	THUNDERBIRD-IRRIGATED	HRW	69
KS	FINNEY-CO	67846	VICTORY-DRYLAND	HRW	68
KS	FINNEY-CO	67846	VICTORY-IRRIGATED	HRW	61
KS	FINNEY-CO	67846	ABILENE-DRYLAND	HRW	62
KS	FRANKLIN-CO	66067	ABILENE-DRYLAND	HRW	58
KS	FRANKLIN-CO	66067	ARKAN-DRYLAND	SRW	17
KS	FRANKLIN-CO	66067	BECKER-DRYLAND	SRW	59
KS	FRANKLIN-CO	66067	BH-122-DRYLAND	SRW	21
KS	FRANKLIN-CO	66067	CALDWELL-DRYLAND	HRW	72
KS	FRANKLIN-CO	66067	CENTURA-DRYLAND	HRW	57
KS	FRANKLIN-CO	66067	CENTURY-DRYLAND	HRW	44
KS	FRANKLIN-CO	66067	CHISHOLM-DRYLAND	SRW	22
KS	FRANKLIN-CO	66067	COMPTON-DRYLAND	HRW	56
KS	FRANKLIN-CO	66067	DELANGE-7837-DRYLAND	HRW	52
KS	FRANKLIN-CO	66067	DELANGE-7846-DRYLAND	HRW	56
KS	FRANKLIN-CO	66067	DODGE-DRYLAND	HRW	68
KS	FRANKLIN-CO	66067	LARNED-DRYLAND	HRW	60
KS	FRANKLIN-CO	66067	MESA-DRYLAND	SRW	15
KS	FRANKLIN-CO	66067	MO-9965-EXP-DRYLAND		

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	FRANKLIN-CO	66067	NEWTON-DRYLAND	HRW	53
KS	FRANKLIN-CO	66067	NORKAN	HRW	56
KS	FRANKLIN-CO	66067	PIONEER-2154	HRW	71
KS	FRANKLIN-CO	66067	PIONEER-2551	SRW	23
KS	FRANKLIN-CO	66067	RIO-BLANCO-DRYLAND	HWW	61
KS	FRANKLIN-CO	66067	SCOUT-66	HRW	63
KS	FRANKLIN-CO	66067	SIOUXLAND	HRW	60
KS	FRANKLIN-CO	66067	TAM-105	HRW	63
KS	FRANKLIN-CO	66067	TAM-107	HRW	71
KS	FRANKLIN-CO	66067	TAM-108	HRW	49
KS	FRANKLIN-CO	66067	THUNDERBIRD-DRYLAND	HRW	66
KS	FRANKLIN-CO	66067	VICTORY-DRYLAND	HRW	63
KS	FRANKLIN-CO	66067	W85-120-EXP-DRYLAND	HRW	67
KS	GARDEN-CITY	67846	MESA	HRW	75
KS	GARDEN-CITY	67846	MESA	HRW	75
KS	GARDEN-CITY	67846	TAM-107	HRW	82
KS	GARDEN-CITY	67846	THUNDERBIRD	HRW	67
KS	GARDEN-CITY	67846	THUNDERBIRD	HRW	80
KS	GARDEN-CITY	67846	THUNDERBIRD	HRW	81
KS	GARDEN-CITY	67846	VICTORY	HRW	78
KS	GIRARD	66743	MESA	HRW	64
KS	GIRARD	66743	THUNDERBIRD	HRW	71
KS	GREELEY	66033	ABILENE	HRW	77
KS	GREELEY	66033	SIOUXLAND	HRW	59
KS	GREELEY	66033	THUNDERBIRD	HRW	67
KS	GREELEY-CO	67879	ABILENE-DRYLAND	HRW	59
KS	GREELEY-CO	67879	ABILENE-DRYLAND	HRW	72
KS	GREELEY-CO	67879	ARKAN-DRYLAND	HRW	61
KS	GREELEY-CO	67879	ARKAN-IRRIGATED	HRW	59
KS	GREELEY-CO	67879	BRONCO-DRYLAND	HRW	63
KS	GREELEY-CO	67879	CARSON-DRYLAND	HRW	67
KS	GREELEY-CO	67879	CENTURY-DRYLAND	HRW	73
KS	GREELEY-CO	67879	CHISHOLM-DRYLAND	HRW	46
KS	GREELEY-CO	67879	CODY-DRYLAND	HRW	72
KS	GREELEY-CO	67879	CODY-IRRIGATED	HRW	65
KS	GREELEY-CO	67879	COLT-DRYLAND	HRW	64
KS	GREELEY-CO	67879	COLT-IRRIGATED	HRW	62
KS	GREELEY-CO	67879	DODGE-DRYLAND	HRW	65
KS	GREELEY-CO	67879	DODGE-DRYLAND	HRW	70
KS	GREELEY-CO	67879	KARL-DRYLAND	HRW	69
KS	GREELEY-CO	67879	KARL-IRRIGATED	HRW	67
KS	GREELEY-CO	67879	LARNED-DRYLAND	HRW	67
KS	GREELEY-CO	67879	MESA-DRYLAND	HRW	71
KS	GREELEY-CO	67879	MESA-IRRIGATED	HRW	63
KS	GREELEY-CO	67879	MUSTANG-DRYLAND	HRW	71
KS	GREELEY-CO	67879	MUSTANG-IRRIGATED	HRW	61
KS	GREELEY-CO	67879	NEWTON-DRYLAND	HRW	63
KS	GREELEY-CO	67879	NEWTON-IRRIGATED	HRW	52
KS	GREELEY-CO	67879	NORKAN-DRYLAND	HRW	66
KS	GREELEY-CO	67879	NORKAN-IRRIGATED	HRW	65
KS	GREELEY-CO	67879	PIONEER-2154-DRYLAND	HRW	57

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	GREELEY-CO	67879	PIONEER-2154-DRYLAND	HRW	74
KS	GREELEY-CO	67879	PIONEER-2157-DRYLAND	HRW	57
KS	GREELEY-CO	67879	PIONEER-2157-IRRIGATED	HRW	53
KS	GREELEY-CO	67879	PIONEER-2172-DRYLAND	HRW	76
KS	GREELEY-CO	67879	PIONEER-2172-IRRIGATED	HRW	71
KS	GREELEY-CO	67879	QUANTUM-578-DRYLAND	HRW	77
KS	GREELEY-CO	67879	QUANTUM-578-IRRIGATED	HRW	55
KS	GREELEY-CO	67879	REDLAND-DRYLAND	HRW	63
KS	GREELEY-CO	67879	RIO-BLANCO-IRRIGATED	HRW	59
KS	GREELEY-CO	67879	SANDY-DRYLAND	HRW	74
KS	GREELEY-CO	67879	SCOUT-66-DRYLAND	HRW	71
KS	GREELEY-CO	67879	SIOUXLAND-DRYLAND	HRW	71
KS	GREELEY-CO	67879	SIOUXLAND-IRRIGATED	HRW	60
KS	GREELEY-CO	67879	STALLION-IRRIGATED	HRW	63
KS	GREELEY-CO	67879	TAM-105-DRYLAND	HRW	56
KS	GREELEY-CO	67879	TAM-105-DRYLAND	HRW	79
KS	GREELEY-CO	67879	TAM-107-DRYLAND	HRW	65
KS	GREELEY-CO	67879	TAM-107-DRYLAND	HRW	71
KS	GREELEY-CO	67879	TAM-108-DRYLAND	HRW	50
KS	GREELEY-CO	67879	TAM-108-DRYLAND	HRW	66
KS	GREELEY-CO	67879	TAM-200-DRYLAND	HRW	68
KS	GREELEY-CO	67879	TAM-200-IRRIGATED	HRW	59
KS	GREELEY-CO	67879	THUNDERBIRD-DRYLAND	HRW	78
KS	GREELEY-CO	67879	THUNDERBIRD-IRRIGATED	HRW	72
KS	GREELEY-CO	67879	VICTORY-IRRIGATED	HRW	63
KS	HARVEY-CO	67114	ABILENE-DRYLAND	HRW	53
KS	HARVEY-CO	67114	ARKAN-DRYLAND	HRW	57
KS	HARVEY-CO	67114	BH-122-DRYLAND	HRW	47
KS	HARVEY-CO	67114	BH-203A-DRYLAND	HRW	46
KS	HARVEY-CO	67114	CENTURY-DRYLAND	HRW	50
KS	HARVEY-CO	67114	CHISHOLM-DRYLAND	HRW	38
KS	HARVEY-CO	67114	DELANGE-7837-DRYLAND	HRW	53
KS	HARVEY-CO	67114	LARNED-DRYLAND	HRW	57
KS	HARVEY-CO	67114	MESA-DRYLAND	HRW	59
KS	HARVEY-CO	67114	MUSTANG-DRYLAND	HRW	53
KS	HARVEY-CO	67114	NEWTON-DRYLAND	HRW	53
KS	HARVEY-CO	67114	NORKAN-DRYLAND	HRW	59
KS	HARVEY-CO	67114	PIONEER-2154-DRYLAND	HRW	73
KS	HARVEY-CO	67114	PIONEER-2157-DRYLAND	HRW	50
KS	HARVEY-CO	67114	PIONEER-2172-DRYLAND	HRW	72
KS	HARVEY-CO	67114	RIO-BLANCO-DRYLAND	HRW	51
KS	HARVEY-CO	67114	SCOUT-66-DRYLAND	HRW	66
KS	HARVEY-CO	67114	SIOUXLAND-DRYLAND	HRW	61
KS	HARVEY-CO	67114	STALLION-DRYLAND	HRW	54
KS	HARVEY-CO	67114	TAM-105-DRYLAND	HRW	63
KS	HARVEY-CO	67114	TAM-108-DRYLAND	HRW	47
KS	HARVEY-CO	67114	TAM-200-DRYLAND	HRW	46
KS	HARVEY-CO	67114	THUNDERBIRD-DRYLAND	HRW	66
KS	HARVEY-CO	67114	VICTORY-DRYLAND	HRW	58
KS	HAVEN	67543	ARKAN	HRW	65
KS	HAVILAND	67059	ARKAN	HRW	63

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	HILLSBORO	67063	ARKAN	HRW	58
KS	HOPE	67451	NORKAN	HRW	66
KS	HOPE	67451	RH7837	HRW	61
KS	HOPE	67451	RH7846	HRW	57
KS	HUGOTON	67951	THUNDERBIRD	HRW	68
KS	INMAN	67546	TRIUMPH-64	HRW	55
KS	JEWELL	66949	NORKAN	HRW	71
KS	KINGMAN	67068	ABILENE	HRW	73
KS	LABETTE	67350	ABILENE-DRYLAND	HRW	68
KS	LABETTE	67350	ARKAN-DRYLAND	HRW	66
KS	LABETTE	67350	BECKER-DRYLAND	SRW	26
KS	LABETTE	67350	BH-122-DRYLAND	HRW	55
KS	LABETTE	67350	BH-203A-DRYLAND	HRW	53
KS	LABETTE	67350	CENTURY-DRYLAND	HRW	67
KS	LABETTE	67350	COMPTON-DRYLAND	SRW	26
KS	LABETTE	67350	DELANGE-7834-DRYLAND	HRW	62
KS	LABETTE	67350	DELANGE-7846-DRYLAND	HRW	68
KS	LABETTE	67350	KARL-DRYLAND	HRW	68
KS	LABETTE	67350	LARNED-DRYLAND	HRW	73
KS	LABETTE	67350	MESA-DRYLAND	HRW	72
KS	LABETTE	67350	MO-9965-EXP-DRYLAND	SRW	14
KS	LABETTE	67350	MUSTANG-DRYLAND	HRW	66
KS	LABETTE	67350	NEWTON-DRYLAND	HRW	66
KS	LABETTE	67350	NORKAN-DRYLAND	HRW	68
KS	LABETTE	67350	PIONEER-2154-DRYLAND	HRW	84
KS	LABETTE	67350	PIONEER-2157-DRYLAND	HRW	66
KS	LABETTE	67350	PIONEER-2172-DRYLAND	HRW	84
KS	LABETTE	67350	PIONEER-2551-DRYLAND	SRW	22
KS	LABETTE	67350	RIO-BIANCO-DRYLAND	HRW	66
KS	LABETTE	67350	SCOUT-66-DRYLAND	HRW	74
KS	LABETTE	67350	SIOUXLAND-DRYLAND	HRW	70
KS	LABETTE	67350	STAR-SEED-830-DRYLAND	HRW	76
KS	LABETTE	67350	TAM-105-DRYLAND	HRW	74
KS	LABETTE	67350	TAM-107-DRYLAND	HRW	53
KS	LABETTE	67350	TAM-108-DRYLAND	HRW	79
KS	LABETTE	67350	TERRA-SR86-DRYLAND	SRW	30
KS	LABETTE	67350	THUNDERBIRD-DRYLAND	HRW	80
KS	LABETTE	67350	TRIUMPH-64-DRYLAND	HRW	68
KS	LABETTE	67350	VICTORY-DRYLAND	HRW	68
KS	LABETTE	67350	W85-120-EXP-DRYLAND	HRW	80
KS	LANGDON	67549	NEWTON	HRW	61
KS	LARNED	67550	DODGE	HRW	72
KS	LARNED	67550	LARNED	HRW	76
KS	LARNED	67550	TAM-107	HRW	79
KS	LITTLE-RIVER	67457	THUNDERBIRD	HRW	70
KS	LYONS	67554	SIOUXLAND	HRW	68
KS	MANHATTAN	66502	ARKAN	HRW	65
KS	MANHATTAN	66502	MESA	HRW	73
KS	MANHATTAN	66502	NEWTON	HRW	53
KS	MANHATTAN	66502	NORKAN	HRW	54
KS	MANTER	67862	DODGE	HRW	73

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	MANTER	67862	EAGLE	HRW	76
KS	MANTER	67862	NEWTON	HRW	70
KS	MANTER	67862	TAM-107	HRW	83
KS	MENLO	67746	LARNED	HRW	71
KS	MENTOR	67401	ABILENE	HRW	64
KS	MILFORD	66514	ARKAN	HRW	61
KS	MILTONVALE	67466	ARKAN	HRW	66
KS	MILTONVALE	67466	NORKAN	HRW	73
KS	MORAN	66755	ABILENE	HRW	69
KS	MORAN	66755	ARKAN	HRW	45
KS	MORAN	66755	CALDWELL	SRW	19
KS	MORAN	66755	MESA	HRW	59
KS	MORAN	66755	TAM-107	HRW	63
KS	OSBORN	67473	NEWTON	HRW	61
KS	OSBORN	67473	VICTORY	HRW	72
KS	PALMER	66962	ABILENE	HRW	69
KS	PALMER	66962	ARKAN	HRW	58
KS	PALMER	66962	ARKAN	HRW	70
KS	PALMER	66962	MESA	HRW	76
KS	PALMER	66962	RH7846	HRW	61
KS	PALMER	66962	THUNDERBIRD	HRW	68
KS	PALMER	66962	VICTORY	HRW	69
KS	PARTRIDGE	67566	ABILENE	HRW	66
KS	PARTRIDGE	67566	MESA	HRW	72
KS	PENOKEE	67642	LARNED	HRW	63
KS	PENOKEE	67642	LARNED	HRW	66
KS	RANSOM	67572	DODGE	HRW	67
KS	RANSOM	67572	LARNED	HRW	67
KS	RENO-CO	67501	ABILENE-DRYLAND	HRW	47
KS	RENO-CO	67501	ARKAN-DRYLAND	HRW	45
KS	RENO-CO	67501	BH-122-DRYLAND	HRW	37
KS	RENO-CO	67501	BH-203A-DRYLAND	HRW	36
KS	RENO-CO	67501	BH-206-DRYLAND	HRW	47
KS	RENO-CO	67501	CENTURA-DRYLAND	HRW	50
KS	RENO-CO	67501	CENTURY-DRYLAND	HRW	50
KS	RENO-CO	67501	CHISHOLM-DRYLAND	HRW	27
KS	RENO-CO	67501	DELANGE-7837-DRYLAND	HRW	46
KS	RENO-CO	67501	DELANGE-7846-DRYLAND	HRW	39
KS	RENO-CO	67501	KARL-DRYLAND	HRW	45
KS	RENO-CO	67501	KS84HW196-EXP-DRYLAND	HRW	44
KS	RENO-CO	67501	LARNED-DRYLAND	HRW	45
KS	RENO-CO	67501	MESA-DRYLAND	HRW	53
KS	RENO-CO	67501	MUSTANG-DRYLAND		
KS	RENO-CO	67501	NEWTON-DRYLAND		
KS	RENO-CO	67501	NORKAN-DRYLAND		
KS	RENO-CO	67501	PIONEER-2157-DRYLAND		
KS	RENO-CO	67501	PIONEER-2172-DRYLAND		
KS	RENO-CO	67501	RIO-BLANCO-DRYLAND		
KS	RENO-CO	67501	SIOUXLAND-DRYLAND	HRW	39
KS	RENO-CO	67501	STALLION-DRYLAND	HRW	40
KS	RENO-CO	67501	STALLION-DRYLAND	HRW	48

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	RENO-CO	67501	TAM-105-DRYLAND	HRW	44
KS	RENO-CO	67501	TAM-107-DRYLAND	HRW	54
KS	RENO-CO	67501	TAM-108-DRYLAND	HRW	33
KS	RENO-CO	67501	TAM-108-DRYLAND	HRW	40
KS	RENO-CO	67501	TAM-200-DRYLAND	HRW	43
KS	RENO-CO	67501	THUNDERBIRD-DRYLAND	HRW	51
KS	RENO-CO	67501	TRIUMPH-64-DRYLAND	HRW	47
KS	REPUBLIC-CO	66935	ABILENE-DRYLAND	HRW	66
KS	REPUBLIC-CO	66935	ARKAN-DRYLAND	HRW	58
KS	REPUBLIC-CO	66935	BH-122-DRYLAND	HRW	61
KS	REPUBLIC-CO	66935	BH-203A-DRYLAND	HRW	48
KS	REPUBLIC-CO	66935	CENTURA-DRYLAND	HRW	69
KS	REPUBLIC-CO	66935	CHISHOLM-DRYLAND	HRW	38
KS	REPUBLIC-CO	66935	CODY-DRYLAND	HRW	71
KS	REPUBLIC-CO	66935	COLT-DRYLAND	HRW	56
KS	REPUBLIC-CO	66935	DODGE-DRYLAND	HRW	68
KS	REPUBLIC-CO	66935	KARL-DRYLAND	HRW	62
KS	REPUBLIC-CO	66935	MESA-DRYLAND	HRW	64
KS	REPUBLIC-CO	66935	MUSTANG-DRYLAND	HRW	59
KS	REPUBLIC-CO	66935	NEWTON-DRYLAND	HRW	57
KS	REPUBLIC-CO	66935	NORKAN-DRYLAND	HRW	60
KS	REPUBLIC-CO	66935	PIONEER-2154-DRYLAND	HRW	75
KS	REPUBLIC-CO	66935	PIONEER-2157-DRYLAND	HRW	60
KS	REPUBLIC-CO	66935	PIONEER-2172-DRYLAND	HRW	73
KS	REPUBLIC-CO	66935	QUANTUM-562-DRYLAND	HRW	61
KS	REPUBLIC-CO	66935	REDLAND-DRYLAND	HRW	65
KS	REPUBLIC-CO	66935	SCOUT-66-DRYLAND	HRW	64
KS	REPUBLIC-CO	66935	STAR-SEED-830-DRYLAND	HRW	64
KS	REPUBLIC-CO	66935	TAM-105-DRYLAND	HRW	64
KS	REPUBLIC-CO	66935	TAM-107-DRYLAND	HRW	73
KS	REPUBLIC-CO	66935	TAM-108-DRYLAND	HRW	55
KS	REPUBLIC-CO	66935	TAM-200-DRYLAND	HRW	59
KS	REPUBLIC-CO	66935	THUNDERBIRD-DRYLAND	HRW	68
KS	REPUBLIC-CO	66935	TRAILBLAZER-DRYLAND	HRW	65
KS	REPUBLIC-CO	66935	VICTORY-DRYLAND	HRW	63
KS	RILEY-CO	66502	ARKAN-DRYLAND	HRW	58
KS	RILEY-CO	66502	CALDWELL-DRYLAND	SRW	19
KS	RILEY-CO	66502	CENTURA-DRYLAND	HRW	73
KS	RILEY-CO	66502	CENTURY-DRYLAND	HRW	60
KS	RILEY-CO	66502	CHISHOLM-DRYLAND	HRW	38
KS	RILEY-CO	66502	COLT-DRYLAND	HRW	50
KS	RILEY-CO	66502	COMPTON-DRYLAND	SRW	15
KS	RILEY-CO	66502	DELANGE-7846-DRYLAND	HRW	57
KS	RILEY-CO	66502	KARL-DRYLAND	HRW	55
KS	RILEY-CO	66502	LARNED-DRYLAND	HRW	64
KS	RILEY-CO	66502	MESA-DRYLAND	HRW	62
KS	RILEY-CO	66502	MO-9965-EXP-DRYLAND	SRW	8
KS	RILEY-CO	66502	MUSTANG-DRYLAND	HRW	60
KS	RILEY-CO	66502	NEWTON-DRYLAND	HRW	56
KS	RILEY-CO	66502	NORKAN-DRYLAND	HRW	59
KS	RILEY-CO	66502	PIONEER-2154-DRYLAND	HRW	80

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	RILEY-CO	66502	PIONEER-2157-DRYLAND	HRW	50
KS	RILEY-CO	66502	PIONEER-2172-DRYLAND	HRW	60
KS	RILEY-CO	66502	PIONEER-2551-DRYLAND	SRW	19
KS	RILEY-CO	66502	RIO-BLANCO-DRYLAND	HRW	56
KS	RILEY-CO	66502	SCOUT-66-DRYLAND	HRW	64
KS	RILEY-CO	66502	SIOUXLAND-DRYLAND	HRW	62
KS	RILEY-CO	66502	STAR-SEED-830-DRYLAND	HRW	67
KS	RILEY-CO	66502	TAM-105-DRYLAND	HRW	65
KS	RILEY-CO	66502	TAM-107-DRYLAND	HRW	72
KS	RILEY-CO	66502	TAM-108-DRYLAND	HRW	51
KS	RILEY-CO	66502	TAM-200-DRYLAND	HRW	55
KS	RILEY-CO	66502	THUNDERBIRD-DRYLAND	HRW	68
KS	RILEY-CO	66502	VICTORY-DRYLAND	HRW	60
KS	RILEY-CO	66502	W85-162-EXP-DRYLAND	HRW	59
KS	SABETHA	66534	ARKAN	HRW	55
KS	SABETHA	66534	NORKAN	HRW	63
KS	SATANTA	67870	TAM-107	HRW	79
KS	STAFFORD-CO	67576	ABILENE-DRYLAND	HRW	61
KS	STAFFORD-CO	67576	ABILENE-IRRIGATED	HRW	60
KS	STAFFORD-CO	67576	ARKAN-DRYLAND	HRW	52
KS	STAFFORD-CO	67576	ARKAN-IRRIGATED	HRW	55
KS	STAFFORD-CO	67576	BH-122-DRYLAND	HRW	51
KS	STAFFORD-CO	67576	BH-122-IRRIGATED	HRW	47
KS	STAFFORD-CO	67576	BH-203A-DRYLAND	HRW	42
KS	STAFFORD-CO	67576	BH-203A-IRRIGATED	HRW	42
KS	STAFFORD-CO	67576	BH-206-IRRIGATED	HRW	62
KS	STAFFORD-CO	67576	BRONCO-DRYLAND	HRW	55
KS	STAFFORD-CO	67576	CALDWELL-IRRIGATED	SRW	25
KS	STAFFORD-CO	67576	CARSON-DRYLAND	HRW	60
KS	STAFFORD-CO	67576	CENTURA-DRYLAND	HRW	65
KS	STAFFORD-CO	67576	CENTURY-DRYLAND	HRW	60
KS	STAFFORD-CO	67576	CENTURY-IRRIGATED	HRW	55
KS	STAFFORD-CO	67576	CHISHOLM-DRYLAND	HRW	37
KS	STAFFORD-CO	67576	CHISHOLM-IRRIGATED	HRW	37
KS	STAFFORD-CO	67576	C0820026-EXP-IRRIGATED	HRW	54
KS	STAFFORD-CO	67576	COMPTON-IRRIGATED	SRW	18
KS	STAFFORD-CO	67576	DELANGE-7837-DRYLAND	HRW	50
KS	STAFFORD-CO	67576	DELANGE-7846-DRYLAND	HRW	54
KS	STAFFORD-CO	67576	DODGE-DRYLAND	HRW	59
KS	STAFFORD-CO	67576	DODGE-IRRIGATED	HRW	56
KS	STAFFORD-CO	67576	KARL-DRYLAND	HRW	62
KS	STAFFORD-CO	67576	KARL-IRRIGATED	HRW	55
KS	STAFFORD-CO	67576	K884HW196-EXP-DRYLAND	HRW	56
KS	STAFFORD-CO	67576	LARNED-DRYLAND	HRW	63
KS	STAFFORD-CO	67576	MESA-DRYLAND	HRW	68
KS	STAFFORD-CO	67576	MESA-IRRIGATED	HRW	64
KS	STAFFORD-CO	67576	NEWTON-DRYLAND	HRW	58
KS	STAFFORD-CO	67576	NEWTON-IRRIGATED	HRW	49
KS	STAFFORD-CO	67576	NORKAN-IRRIGATED	HRW	59
KS	STAFFORD-CO	67576	PIONEER-2154-DRYLAND	HRW	75
KS	STAFFORD-CO	67576	PIONEER-2154-IRRIGATED	HRW	77

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	STAFFORD-CO	67576	PIONEER-2157-DRYLAND	HRW	52
KS	STAFFORD-CO	67576	PIONEER-2157-IRRIGATED	HRW	53
KS	STAFFORD-CO	67576	PIONEER-2172-DRYLAND	HRW	68
KS	STAFFORD-CO	67576	RIO-BLANCO-DRYLAND	HWW	61
KS	STAFFORD-CO	67576	RIO-BLANCO-IRRIGATED	HWW	58
KS	STAFFORD-CO	67576	SANDY-DRYLAND	HRW	68
KS	STAFFORD-CO	67576	SCOUT-66-DRYLAND	HRW	63
KS	STAFFORD-CO	67576	SIOUXLAND-DRYLAND	HRW	59
KS	STAFFORD-CO	67576	SIOUXLAND-IRRIGATED	HRW	61
KS	STAFFORD-CO	67576	STALLION-DRYLAND	HRW	60
KS	STAFFORD-CO	67576	STALLION-IRRIGATED	HRW	60
KS	STAFFORD-CO	67576	TAM-105-DRYLAND	HRW	62
KS	STAFFORD-CO	67576	TAM-105-IRRIGATED	HRW	57
KS	STAFFORD-CO	67576	TAM-107-DRYLAND	HRW	68
KS	STAFFORD-CO	67576	TAM-108-DRYLAND	HRW	44
KS	STAFFORD-CO	67576	TAM-108-IRRIGATED	HRW	50
KS	STAFFORD-CO	67576	TAM-200-DRYLAND	HRW	53
KS	STAFFORD-CO	67576	THUNDERBIRD-IRRIGATED	HRW	67
KS	STAFFORD-CO	67576	VICTORY-DRYLAND	HRW	63
KS	STAFFORD-CO	67576	VICTORY-IRRIGATED	HRW	61
KS	STAFFORD-CO	67576	VONA-DRYLAND	HRW	51
KS	SUBLETTE	67877	SCOUT-66	HRW	76
KS	SUBLETTE	67877	TAM-107	HRW	74
KS	SYLVAN-GROVE	67481	ARKAN	HRW	65
KS	SYLVAN-GROVE	67481	ARKAN	HRW	65
KS	THOMAS-CO	66701	ABILENE-DRYLAND	HRW	63
KS	THOMAS-CO	66701	ARKAN-DRYLAND	HRW	59
KS	THOMAS-CO	66701	ARKAN-IRRIGATED	HRW	60
KS	THOMAS-CO	66701	BH-122-IRRIGATED	HRW	58
KS	THOMAS-CO	66701	BH-203A-IRRIGATED	HRW	46
KS	THOMAS-CO	66701	CARSON-DRYLAND	HRW	67
KS	THOMAS-CO	66701	CENTURA-DRYLAND	HRW	75
KS	THOMAS-CO	66701	CENTURY-IRRIGATED	HRW	61
KS	THOMAS-CO	66701	CHISHOLM-IRRIGATED	HRW	54
KS	THOMAS-CO	66701	CO820026-EXP-DRYLAND	HRW	60
KS	THOMAS-CO	66701	CO820026-EXP-IRRIGATED	HRW	62
KS	THOMAS-CO	66701	CODY-DRYLAND	HRW	71
KS	THOMAS-CO	66701	CODY-IRRIGATED	HRW	67
KS	THOMAS-CO	66701	COLT-DRYLAND	HRW	60
KS	THOMAS-CO	66701	DELANGE-7837-DRYLAND	HRW	59
KS	THOMAS-CO	66701	DELANGE-7846-DRYLAND	HRW	60
KS	THOMAS-CO	66701	DODGE-DRYLAND	HRW	62
KS	THOMAS-CO	66701	KARL-DRYLAND	HRW	70
KS	THOMAS-CO	66701	KARL-IRRIGATED	HRW	63
KS	THOMAS-CO	66701	KS84W196-EXP-DRYLAND	HWW	70
KS	THOMAS-CO	66701	KS84WH196-EXP-IRRIGATED	HWW	67
KS	THOMAS-CO	66701	LARNED-DRYLAND	HRW	65
KS	THOMAS-CO	66701	MESA-DRYLAND	HRW	60
KS	THOMAS-CO	66701	MESA-IRRIGATED	HRW	60
KS	THOMAS-CO	66701	MUSTANG-DRYLAND	HRW	63
KS	THOMAS-CO	66701	NEWTON-DRYLAND	HRW	58

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
KS	THOMAS-CO	66701	NORKAN-DRYLAND	HRW	65
KS	THOMAS-CO	66701	PIONEER-2154-IRRIGATED	HRW	76
KS	THOMAS-CO	66701	PIONEER-2172-DRYLAND	HRW	71
KS	THOMAS-CO	66701	PIONEER-2172-IRRIGATED	HRW	76
KS	THOMAS-CO	66701	QUANTUM-562-DRYLAND	HRW	59
KS	THOMAS-CO	66701	QUANTUM-578-IRRIGATED	HRW	63
KS	THOMAS-CO	66701	REDLAND-DRYLAND	HRW	57
KS	THOMAS-CO	66701	RIO-BLANCO-DRYLAND	HRW	61
KS	THOMAS-CO	66701	RIO-BLANCO-IRRIGATED	HRW	58
KS	THOMAS-CO	66701	SCOUT-66-DRYLAND	HRW	68
KS	THOMAS-CO	66701	SIOUXLAND-IRRIGATED	HRW	65
KS	THOMAS-CO	66701	TAM-105-DRYLAND	HRW	53
KS	THOMAS-CO	66701	TAM-105-IRRIGATED	HRW	69
KS	THOMAS-CO	66701	TAM-107-DRYLAND	HRW	72
KS	THOMAS-CO	66701	TAM-107-IRRIGATED	HRW	72
KS	THOMAS-CO	66701	TAM-108	HRW	64
KS	THOMAS-CO	66701	TAM-108-IRRIGATED	HRW	55
KS	THOMAS-CO	66701	TAM-200-DRYLAND	HRW	57
KS	THOMAS-CO	66701	TAM-200-IRRIGATED	HRW	59
KS	THOMAS-CO	66701	THUNDERBIRD-DRYLAND	HRW	70
KS	THOMAS-CO	66701	THUNDERBIRD-IRRIGATED	HRW	70
KS	THOMAS-CO	66701	VICTORY-DRYLAND	HRW	67
KS	THOMAS-CO	66701	VICTORY-IRRIGATED	HRW	66
KS	TIMKEN	67582	DODGE	HRW	69
KS	TIMKEN	67582	NEWTON	HRW	59
KS	TIMKEN	67582	TAM-107	HRW	81
KS	ULYSSES	67880	MESA	HRW	68
KS	ULYSSES	67880	THUNDERBIRD	HRW	85
KS	WAKENEY	67672	LARNED	HRW	71
KS	WILSEY	66873	ABILENE	HRW	62
KS	WILSEY	66873	VICTORY	HRW	59
KS	WINFIELD	67156	MESA	HRW	64
KS	WINFIELD	67156	MESA	HRW	66
KS	WINFIELD	67156	VICTORY	HRW	54
KS	WINONA	67764	TAM-107	HRW	79
MN	CROOKSTON	56716	LEN	HRS	72
MN	CROOKSTON	56716	MARSHALL	HRS	66
MN	CROOKSTON	56716	PIONEER-2360	HRS	78
MN	CROOKSTON	56716	STOA	HRS	73
MN	CROOKSTON	56716	WHEATON	HRS	70
MN	MORRIS	56267	LEN	HRS	81
MN	MORRIS	56267	MARSHALL	HRS	69
MN	MORRIS	56267	PIONEER-2306	HRS	78
MN	MORRIS	56267	STOA	HRS	79
MN	MORRIS	56267	WHEATON	HRS	75
MN	ST-PAUL	55101	LEN	HRS	81
MN	ST-PAUL	55101	MARSHALL	HRS	76
MN	ST-PAUL	55101	PIONEER-2360	HRS	84
MN	ST-PAUL	55101	STOA	HRS	87
OK	ALTUS	73521	CENTURY-88	HRW	36
OK	ALTUS	73521	CENTURY-88	HRW	57

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION

STATE	REGION	ZIPCODE	VARIETY	CLASS
OK	ALTUS	73521	CHISHOLM-88	HRW
OK	ALTUS	73521	CHISHOLM-88	HRW
OK	ALTUS	73521	MUSTANG-88	HRW
OK	ALTUS	73521	PIONEER-2157-88	HRW
OK	ALTUS	73521	SIOUXLAND-88	HRW
OK	ALTUS	73521	TAM-101-88	HRW
OK	ALTUS	73521	TAM-101-88	HRW
OK	ALTUS	73521	TRIUMPH-64-88	HRW
OK	ALTUS	73521	TRIUMPH-64-88	HRW
OK	GOODWELL	73939	CENTURY-87	HRW
OK	GOODWELL	73939	CENTURY-87-IRRIGATED	HRW
OK	GOODWELL	73939	CENTURY-88	HRW
OK	GOODWELL	73939	CENTURY-88-IRRIGATED	HRW
OK	GOODWELL	73939	CHISHOLM-87	HRW
OK	GOODWELL	73939	CHISHOLM-88	HRW
OK	GOODWELL	73939	CHISHOLM-88-IRRIGATED	HRW
OK	GOODWELL	73939	MUSTANG-87	HRW
OK	GOODWELL	73939	MUSTANG-87-IRRIGATED	HRW
OK	GOODWELL	73939	PIONEER-2157-88	HRW
OK	GOODWELL	73939	PIONEER-2157-88-IRRIGATED	HRW
OK	GOODWELL	73939	SIOUXLAND-87	HRW
OK	GOODWELL	73939	SIOUXLAND-87-IRRIGATED	HRW
OK	GOODWELL	73939	SIOUXLAND-88	HRW
OK	GOODWELL	73939	SIOUXLAND-88-IRRIGATED	HRW
OK	GOODWELL	73939	TAM-101-87	HRW
OK	GOODWELL	73939	TAM-101-87-IRRIGATED	HRW
OK	GOODWELL	73939	TAM-101-88	HRW
OK	GOODWELL	73939	TAM-101-88-IRRIGATED	HRW
OK	GOODWELL	73939	TRIUMPH-64-87-IRRIGATED	HRW
OK	GOODWELL	73939	TRIUMPH-64-88	HRW
OK	GOODWELL	73939	TRIUMPH-64-88-IRRIGATED	HRW
OK	LAHOMA	73754	CENTURY-87	HRW
OK	LAHOMA	73754	CENTURY-88	HRW
OK	LAHOMA	73754	CHISHOLM-87	HRW
OK	LAHOMA	73754	CHISHOLM-88	HRW
OK	LAHOMA	73754	MUSTANG-87	HRW
OK	LAHOMA	73754	PIONEER-2157-88	HRW
OK	LAHOMA	73754	SIOUXLAND-87	HRW
OK	LAHOMA	73754	TAM-101-87	HRW
OK	LAHOMA	73754	TAM-101-88	HRW
OK	LAHOMA	73754	TRIUMPH-64-88	HRW
OK	NORDIN	74631	ABILENE	HRW
OK	NORDIN	74631	ARKAN	HRW
OK	NORDIN	74631	BH-122	HRW
OK	NORDIN	74631	BH-301	HRW
OK	NORDIN	74631	CARSON	HRW
OK	NORDIN	74631	CHISHOLM	HRW
OK	NORDIN	74631	KARL	HRW
OK	NORDIN	74631	MUSTANG	HRW
OK	NORDIN	74631	NORKAN	HRW
OK	NORDIN	74631	PIONEER-2154	HRW

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
OK	NORDIN	74631	PIONEER-2157	HRW	61
OK	NORDIN	74631	PIONEER-2163	HRW	62
OK	NORDIN	74631	PIONEER-2172	HRW	74
OK	NORDIN	74631	QUANTUM-378	HRW	57
OK	NORDIN	74631	QUANTUM-564	HRW	54
OK	NORDIN	74631	RH-7833	HRW	57
OK	NORDIN	74631	RH-7837	HRW	55
OK	NORDIN	74631	RIO-BLANCO	HWW	58
OK	NORDIN	74631	STALLION	HRW	64
OK	NORDIN	74631	TAM-105	HRW	68
OK	NORDIN	74631	TAM-107	HRW	70
OK	NORDIN	74631	TAM-108	HRW	48
OK	NORDIN	74631	TAM-200	HRW	66
OK	NORDIN	74631	TRAILBLAZER	HRW	68
OK	NORDIN	74631	WRANGLER	HRW	67
OK	STILLWELL	74960	CENTURY-87	HRW	41
OK	STILLWELL	74960	CENTURY-88	HRW	66
OK	STILLWELL	74960	CHISHOLM-87	HRW	28
OK	STILLWELL	74960	CHISHOLM-88	HRW	42
OK	STILLWELL	74960	PIONEER-2157-88	HRW	59
OK	STILLWELL	74960	SIOUXLAND-87	HRW	50
OK	STILLWELL	74960	SIOUXLAND-88	HRW	69
OK	STILLWELL	74960	TAM-101-87	HRW	45
OK	STILLWELL	74960	TAM-101-88	HRW	63
OK	STILLWELL	74960	TRIUMPH-64-87	HRW	40
OK	STILLWELL	74960	TRIUMPH-64-88	HRW	54
OK	WOODWARD	73801	CENTURY-88	HRW	61
OK	WOODWARD	73801	CHISHOLM-87	HRW	29
OK	WOODWARD	73801	CHISHOLM-88	HRW	43
OK	WOODWARD	73801	MUSTANG-87	HRW	46
OK	WOODWARD	73801	PIONEER-2157-88	HRW	52
OK	WOODWARD	73801	SIOUXLAND-87	HRW	50
OK	WOODWARD	73801	SIOUXLAND-88	HRW	61
OK	WOODWARD	73801	TAM-101	HRW	52
OK	WOODWARD	73801	TAM-101-87	HRW	45
OK	WOODWARD	73801	TRIUMPH-64-87	HRW	41
OK	WOODWARD	73801	TRIUMPH-64-88	HRW	53
OR	CORVALLIS	97330	CENTURY	HRW	52
OR	CORVALLIS	97330	CHEYENNE	HRW	64
OR	CORVALLIS	97330	COLT	HRW	43
OR	CORVALLIS	97330	DODGE	HRW	48
OR	CORVALLIS	97330	DUSTY	SWW	21
OR	CORVALLIS	97330	HILL-81	SWW	24
OR	CORVALLIS	97330	KS-4578	HRW	68
OR	CORVALLIS	97330	KS-831862	HWW	65
OR	CORVALLIS	97330	MALCOLM	SWW	27
OR	CORVALLIS	97330	NORKAN	HRW	60
OR	CORVALLIS	97330	OR-CR8313	HRW	62
OR	CORVALLIS	97330	OR8400464P	SWW	20
OR	CORVALLIS	97330	OR8400882H	SWW	27
OR	CORVALLIS	97330	OR8500305P	SWW	20

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
OR	CORVALLIS	97330	OR8500378H	HW	54
OR	CORVALLIS	97330	OR8500974P	SW	33
OR	CORVALLIS	97330	OR8502288H	SW	18
OR	CORVALLIS	97330	OR8505311P	SW	23
OR	CORVALLIS	97330	OR8600049	HW	64
OR	CORVALLIS	97330	OR8600341	HW	65
OR	CORVALLIS	97330	OR8600471	HW	54
OR	CORVALLIS	97330	OR8600701	HW	66
OR	CORVALLIS	97330	OR860292	SW	21
OR	CORVALLIS	97330	OR860293	SW	23
OR	CORVALLIS	97330	OR860296	SW	32
OR	CORVALLIS	97330	OR860297	HW	31
OR	CORVALLIS	97330	OR860301	SW	23
OR	CORVALLIS	97330	OR860302	SW	24
OR	CORVALLIS	97330	OR860303	SW	20
OR	CORVALLIS	97330	OR860553	SW	31
OR	CORVALLIS	97330	OR860571	SW	20
OR	CORVALLIS	97330	OR860575	SW	17
OR	CORVALLIS	97330	OR860576	SW	30
OR	CORVALLIS	97330	OR860576	SW	32
OR	CORVALLIS	97330	OR860754	SW	34
OR	CORVALLIS	97330	OR860756	HW	50
OR	CORVALLIS	97330	OR861226	SW	30
OR	CORVALLIS	97330	OR861425	SW	28
OR	CORVALLIS	97330	OVESON	SW	20
OR	CORVALLIS	97330	PIONEER-2551	SR	24
OR	HERMISTON	97838	HILL-81	SW	22
OR	HERMISTON	97838	OVESON	SW	31
OR	HERMISTON	97838	STEPHENS	SW	24
OR	HERMISTON	97838	TRES	CLUB	30
OR	MADRAS	97741	STEPHENS	SW	23
OR	MADRAS	97741	STEPHENS	SW	24
OR	MADRAS	97741	STEPHENS	SW	24
OR	MADRAS	97741	STEPHENS	SW	26
OR	MADRAS	97741	STEPHENS	SW	26
OR	MADRAS	97741	STEPHENS	SW	27
OR	MADRAS	97741	STEPHENS	SW	27
OR	MADRAS	97741	STEPHENS	SW	27
OR	MORO	97039	CENTURY	HR	58
OR	MORO	97039	CHEYENNE	HR	62
OR	MORO	97039	COLT	HR	52
OR	MORO	97039	DODGE	HR	57
OR	MORO	97039	DUSTY	SW	11
OR	MORO	97039	HILL-81	SW	27
OR	MORO	97039	KS-831862	HW	70
OR	MORO	97039	MALCOLM	SW	31
OR	MORO	97039	NORKAN	HR	67
OR	MORO	97039	OR-CR8313	HR	61
OR	MORO	97039	OR8400464P	SW	28
OR	MORO	97039	OR8400882H	SW	27

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
OR	MORO	97039	OR8500374H	HW	64
OR	MORO	97039	OR8500378H	HW	62
OR	MORO	97039	OR8500974P	SW	27
OR	MORO	97039	OR8502288H	SW	25
OR	MORO	97039	OR8505311P	SW	42
OR	MORO	97039	OR8600049	HW	66
OR	MORO	97039	OR8600341	HW	63
OR	MORO	97039	OR8600471	HW	48
OR	MORO	97039	OR8600701	HW	73
OR	MORO	97039	OR860293	SW	25
OR	MORO	97039	OR860296	SW	32
OR	MORO	97039	OR860297	HW	25
OR	MORO	97039	OR860301	SW	22
OR	MORO	97039	OR860302	SW	28
OR	MORO	97039	OR860303	SW	27
OR	MORO	97039	OR860436	SW	20
OR	MORO	97039	OR860553	SW	29
OR	MORO	97039	OR860571	SW	28
OR	MORO	97039	OR860576	SW	31
OR	MORO	97039	OR860754	SW	24
OR	MORO	97039	OR860756	HW	39
OR	MORO	97039	OR861219	SW	27
OR	MORO	97039	OR861226	SW	28
OR	MORO	97039	OR861425	SW	27
OR	MORO	97039	OVESON	SW	20
OR	MORO	97039	PIONEER-2551	SR	22
OR	MORO	97039	STEPHENS	SW	30
OR	MORO	97039	TAM-108	HR	43
OR	MORO	97039	TRES	CLUB	27
OR	PENDLETON	97801	DUSTY	SW	19
OR	PENDLETON	97801	HILL-81	SW	28
OR	PENDLETON	97801	OR-CR8313	HR	68
OR	PENDLETON	97801	OR8400882H	SW	24
OR	PENDLETON	97801	OR8500305P	SW	28
OR	PENDLETON	97801	OR8500374H	HW	59
OR	PENDLETON	97801	OR8500378H	HW	63
OR	PENDLETON	97801	OR8500974P	SW	27
OR	PENDLETON	97801	OR8502288H	SW	25
OR	PENDLETON	97801	OR8505311P	SW	48
OR	PENDLETON	97801	OR8600049	HW	72
OR	PENDLETON	97801	OR8600341	HW	68
OR	PENDLETON	97801	OR8600701	HW	68
OR	PENDLETON	97801	OR860292	SW	26
OR	PENDLETON	97801	OR860293	SW	22
OR	PENDLETON	97801	OR860296	SW	30
OR	PENDLETON	97801	OR860301	SW	22
OR	PENDLETON	97801	OR860302	SW	21
OR	PENDLETON	97801	OR860303	SW	21
OR	PENDLETON	97801	OR860436	SW	23
OR	PENDLETON	97801	OR860553	SW	25
OR	PENDLETON	97801	OR860571	SW	18

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
OR	PENDLETON	97801	OR860575	SWW	25
OR	PENDLETON	97801	OR860754	SWW	32
OR	PENDLETON	97801	OR860756	HWW	53
OR	PENDLETON	97801	OR861219	SWW	30
OR	PENDLETON	97801	OR861226	SWW	27
OR	PENDLETON	97801	OR861425	SWW	30
OR	PENDLETON	97801	OVESON	SWW	32
OR	PENDLETON	97801	STEPHENS	SWW	27
OR	PENDLETON	97801	TRES	CLUB	31
OR	WASCO-CO	97063	DUSTY	SWW	16
OR	WASCO-CO	97063	HILL-81	SWW	20
OR	WASCO-CO	97063	MALCOLM	SWW	20
OR	WASCO-CO	97063	OR-CR8313	HRW	63
OR	WASCO-CO	97063	OVESON	SWW	22
OR	WASCO-CO	97063	STEPHENS	SWW	21
OR	WASCO-CO	97063	TRES	CLUB	25
SD	BERESFORD	57004	BUTTE	HRS	72
SD	BERESFORD	57004	GUARD	HRS	63
SD	BERESFORD	57004	LEN	HRS	71
SD	BERESFORD	57004	MARSHALL	HRS	65
SD	BERESFORD	57004	PIONEER-2369	HRS	72
SD	BROOKINGS	57006	BUTTE-86	HRS	86
SD	BROOKINGS	57006	DAWN	HRW	59
SD	BROOKINGS	57006	GUARD	HRS	76
SD	BROOKINGS	57006	LEN	HRS	87
SD	BROOKINGS	57006	MARSHALL	HRS	77
SD	BROOKINGS	57006	REDLAND	HRW	59
SD	BROOKINGS	57006	ROSE	HRW	66
SD	BROOKINGS	57006	ROUGH RIDER	HRW	67
SD	BROOKINGS	57006	SCOUT-66	HRW	64
SD	BROOKINGS	57006	SIOUXLAND	HRW	59
SD	BROOKINGS	57006	STOA	HRS	85
SD	HIGHMORE	57345	BUTTE-86	HRS	79
SD	HIGHMORE	57345	GUARD	HRS	65
SD	HIGHMORE	57345	LEN	HRS	82
SD	HIGHMORE	57345	MARSHALL	HRS	74
SD	HIGHMORE	57345	PIONEER-2369	HRS	77
SD	HIGHMORE	57345	REDLAND	HRW	52
SD	HIGHMORE	57345	ROSE	HRW	61
SD	HIGHMORE	57345	ROUGH RIDER	HRW	62
SD	HIGHMORE	57345	SCOUT-66	HRW	62
SD	HIGHMORE	57345	SIOUXLAND	HRW	58
SD	HIGHMORE	57345	STOA	HRS	77
SD	HIGHMORE	57345	DAWN	HRW	59
SD	HIGHMORE	57345	REDLAND	HRW	51
SD	HIGHMORE	57345	ROSE	HRW	59
SD	HIGHMORE	57345	ROUGH RIDER	HRW	63
SD	HIGHMORE	57345	SCOUT-66	HRW	67
SD	HIGHMORE	57345	SIOUXLAND	HRW	54
SD	HIGHMORE	57345	DAWN	HRW	49
SD	HIGHMORE	57345	DAWN	HRW	55

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
SD	PRESHO	57568	REDLAND	HRW	50
SD	PRESHO	57568	ROSE	HRW	57
SD	PRESHO	57568	ROUGH RIDER	HRW	58
SD	SELBY	57472	BUTTE-86	HRS	83
SD	SELBY	57472	GUARD	HRS	68
SD	SELBY	57472	MARSHALL	HRS	71
SD	SELBY	57472	PIONEER-2364	HRS	79
SD	SELBY	57472	STOA	HRS	64
TX	CHILICOTHE	76384	CENTURY	HRW	56
TX	CHILICOTHE	76384	COLLIN	HRW	29
TX	CHILICOTHE	76384	HAWK	HRW	60
TX	CHILICOTHE	76384	KARL	HRW	69
TX	CHILICOTHE	76384	MESA	HRW	72
TX	CHILICOTHE	76384	MUSTANG	HRW	59
TX	CHILICOTHE	76384	NK-PRO-812	HRW	74
TX	CHILICOTHE	76384	SCOUT-66	HRW	65
TX	CHILICOTHE	76384	SIOUXLAND	HRW	62
TX	CHILICOTHE	76384	TAM-101	HRW	52
TX	CHILICOTHE	76384	TAM-105	HRW	63
TX	CHILICOTHE	76384	TAM-107	HRW	74
TX	CHILICOTHE	76384	TAM-108	HRW	39
TX	CHILICOTHE	76384	TAM-200	HRW	73
TX	CHILICOTHE	76384	TAM-201	HRW	67
TX	MUNDAY	76301	CENTURY	HRW	63
TX	MUNDAY	76301	CHISHOLM	HRW	33
TX	MUNDAY	76301	COLLIN	HRW	26
TX	MUNDAY	76301	HAWK	HRW	70
TX	MUNDAY	76301	KARL	HRW	62
TX	MUNDAY	76301	MESA	HRW	62
TX	MUNDAY	76301	MUSTANG	HRW	63
TX	MUNDAY	76301	NK-PRO-812	HRW	74
TX	MUNDAY	76301	SCOUT-66	HRW	66
TX	MUNDAY	76301	SIOUXLAND	HRW	67
TX	MUNDAY	76301	TAM-101	HRW	57
TX	MUNDAY	76301	TAM-105	HRW	65
TX	MUNDAY	76301	TAM-107	HRW	74
TX	MUNDAY	76301	TAM-200	HRW	72
TX	MUNDAY	76301	TAM-201	HRW	73
TX	OLNEY	76374	CENTURY	HRW	54
TX	OLNEY	76374	CHISHOLM	HRW	32
TX	OLNEY	76374	COLLIN	HRW	22
TX	OLNEY	76374	KARL	HRW	54
TX	OLNEY	76374	MESA	HRW	58
TX	OLNEY	76374	NK-PRO-812	HRW	63
TX	OLNEY	76374	SCOUT-66	HRW	63
TX	OLNEY	76374	SIOUXLAND	HRW	59
TX	OLNEY	76374	TAM-101	HRW	53
TX	OLNEY	76374	TAM-105	HRW	66
TX	OLNEY	76374	TAM-107	HRW	59
TX	OLNEY	76374	TAM-108	HRW	43
TX	OLNEY	76374	TAM-200	HRW	65

TABLE 2. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY LOCATION.

STATE	REGION	ZIPCODE	VARIETY	CLASS	HARDNESS
TX	OLNEY	76374	TAM-201	HRW	55
TX	TOLBERT	76384	CHISHOLM	HRW	30
TX	TOLBERT	76384	COLLIN	HRW	25
TX	TOLBERT	76384	HAWK	HRW	73
TX	TOLBERT	76384	KARL	HRW	53
TX	TOLBERT	76384	MESA	HRW	64
TX	TOLBERT	76384	MUSTANG	HRW	52
TX	TOLBERT	76384	SCOUT-66	HRW	67
TX	TOLBERT	76384	SIOUXLAND	HRW	62
TX	TOLBERT	76384	TAM-101	HRW	63
TX	TOLBERT	76384	TAM-105	HRW	73
TX	TOLBERT	76384	TAM-107	HRW	70
TX	TOLBERT	76384	TAM-108	HRW	42
TX	TOLBERT	76384	TAM-200	HRW	64
TX	TOLBERT	76384	TAM-201	HRW	69

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
40A-DYNASTY	SRW	S-CHARLESTON	OH	45368	22
906-R	HRS	RALEIGH	ND	58564	74
ABILENE	HRW	SUBLETTE	KS	67877	74
ABILENE	HRW	RYUS	KS	67870	76
AGRI-PRO	HRW	CHANUTE	KS	66720	52
AGRI-PRO	HRW	WHITE-CLOUD	KS	66094	81
ALEX	HRS	BEULAH	ND	58523	83
ALEX	HRS	BEULAH	ND	58523	85
ALEX	HRS	TOLLEY	ND	58787	86
ALEX	HRS	BEULAH	ND	58523	92
ANZA	HRW	GERBER	CA	96035	66
ANZA	HRW	ARBUCKLE	CA	95912	68
ANZA	HRW	ARBUCKLE	CA	95912	69
ANZA	HRW	DAVIS	CA	95616	73
ANZA	HRW	ARBUCKLE	CA	95912	73
ANZA	HRW	CLARKSBURG	CA	95612	73
ANZA	HRW	ARBUCKLE	CA	95912	75
ANZA	HRW	WALNUT-GROVE	CA	95690	75
ANZA	HRW	PALERNEO	CA	95968	76
ANZA	HRW	CLARKSBURG	CA	95612	76
ANZA	HRW	WOODLAND	CA	95695	77
ANZA	HRW	CHICO	CA	95926	77
ANZA	HRW	VACAVILLE	CA	95688	77
ANZA	HRW	WOODLAND	CA	95695	77
ANZA	HRW	WALNUT-GROVE	CA	95690	78
ANZA	HRW	WALNUT-GROVE	CA	95690	83
ANZA	HRW	WOODLAND	CA	95695	84
APEX	HRS	COLFAX	ND	58018	69
ARKAN	HRW	CANTON	KS	67428	49
ARKAN	HRW	TAMPA	KS	67483	49
ARKAN	HRW	CANTON	KS	67428	52
ARKAN	HRW	PRESCOTT	KS	66767	53
ARKAN	HRW	GENESEO	KS	67444	53
ARKAN	HRW	CANTON	KS	67428	54
ARKAN	HRW	MINNEAPOLIS	KS	67467	54
ARKAN	HRW	MINNEAPOLIS	KS	67467	55
ARKAN	HRW	CHERRYVALE	KS	67335	55
ARKAN	HRW	OSAGE-CITY	KS	66523	55
ARKAN	HRW	MANHATTAN	KS	66502	55
ARKAN	HRW	BLUFF-CITY	KS	67018	56
ARKAN	HRW	PRESCOTT	KS	66767	56
ARKAN	HRW	CHANUTE	KS	66720	56
ARKAN	HRW	LONGFORD	KS	67458	57
ARKAN	HRW	CHANUTE	KS	66720	57
ARKAN	HRW	CHANUTE	KS	66720	57
ARKAN	HRW	CHERRYVALE	KS	67335	57
ARKAN	HRW	HIAWATHA	KS	66434	57
ARKAN	HRW	EUREKA	KS	67045	58
ARKAN	HRW	GENESEO	KS	67444	58
ARKAN	HRW	EUREKA	KS	67045	58
ARKAN	HRW	MANHATTAN	KS	66502	58

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
ARKAN	HRW	AFTON	OK	74331	59
ARKAN	HRW	GENESEO	KS	67444	60
ARKAN	HRW	LORRAINE	KS	67459	60
ARKAN	HRW	CANTON	KS	67428	60
ARKAN	HRW	LORRAINE	KS	67459	60
ARKAN	HRW	OSAGE-CITY	KS	66523	60
ARKAN	HRW	TAMPA	KS	67483	60
ARKAN	HRW	ST-JOHN	KS	67576	61
ARKAN	HRW	EUREKA	KS	67045	61
ARKAN	HRW	OSAGE-CITY	KS	66523	61
ARKAN	HRW	HARDTNER	KS	67057	62
ARKAN	HRW	ONAGA	KS	66521	62
ARKAN	HRW	ANTHONY	KS	67003	62
ARKAN	HRW	GENESEO	KS	67444	62
ARKAN	HRW	LORRAINE	KS	67459	62
ARKAN	HRW	BLUE-RAPIDS	KS	66411	62
ARKAN	HRW	MINNEAPOLIS	KS	67467	62
ARKAN	HRW	WHITE-CLOUD	KS	66094	62
ARKAN	HRW	EUREKA	KS	67045	62
ARKAN	HRW	BURDICK	KS	66838	63
ARKAN	HRW	GENESEO	KS	67444	63
ARKAN	HRW	ASHERVILLE	KS	67420	63
ARKAN	HRW	EUREKA	KS	67045	63
ARKAN	HRW	HIAWATHA	KS	66434	64
ARKAN	HRW	LINCOLN	KS	67455	64
ARKAN	HRW	DILLWYN	KS	67557	64
ARKAN	HRW	OSAGE-CITY	KS	66523	64
ARKAN	HRW	LINCOLN	KS	67455	65
ARKAN	HRW	LINCOLN	KS	67455	65
ARKAN	HRW	HOLTON	KS	66436	65
ARKAN	HRW	HOLTON	KS	66436	66
ARKAN	HRW	ONAGA	KS	66521	66
ARKAN	HRW	MANHATTAN	KS	66502	66
ARKAN	HRW	ONAGA	KS	66521	66
ARKAN	HRW	WHITE-CLOUD	KS	66094	67
ARKAN	HRW	BLUE-RAPIDS	KS	66411	67
ARKAN	HRW	HIAWATHA	KS	66434	67
ARKAN	HRW	OSAGE-CITY	KS	66523	67
ARKAN	HRW	LINCOLN	KS	67455	68
ARKAN	HRW	EUREKA	KS	67045	68
ARKAN	HRW	CUNNINGHAM	KS	67035	68
ARKAN	HRW	WELLINGTON	KS	67152	68
ARKAN	HRW	EUREKA	KS	67045	69
ARKAN	HRW	CHERRYVALE	KS	67335	70
ARKAN	HRW	PHILLIPSBURG	KS	67661	73
ARKAN	HRW	HOLTON	KS	66436	76
ARKAN	HRW	HIAWATHA	KS	66434	78
AUBURN	SRW	WAYLAND	MO	63472	33
BACA	HRW	VILAS	CO	81087	56
BACA	HRW	VILAS	CO	81087	59
----	HRW	VILAS	CO	81087	61

LE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
✓	HRW	RUSH	CO	80833	63
GER	SRW	PICKERINGTON	OH	43147	17
GER	SRW	S-CHARLESTON	OH	45368	20
GER	SRW	S-CHARLESTON	OH	45368	21
GER	SRW	COLUMBUS	OH	43201	23
GER	SRW	WINCHESTER	OH	45697	24
ITY	HRW	HIAWATHA	KS	66434	84
ITY-205	HRW	LEOTI	KS	67861	35
ITY-205	HRW	LEOTI	KS	67861	39
IZE-CHIEF	HRS	THREE-FORKS	MT	59752	72
LE	HRW	IDALIA	CO	80735	46
LE	HRW	PEETZ	CO	80747	53
LE	HRW	CHAPPELL	NE	69129	54
LE	HRW	CHAPPELL	NE	69129	55
LE	HRW	GURLEY	NE	69141	55
LE	HRW	CHAPPELL	NE	69129	56
LE	HRW	HEMINGFORD	NE	69348	58
LE	HRW	SIDNEY	NE	69162	59
LE	HRW	GORDON	NE	69343	61
LE	HRW	IDALIA	CO	80735	61
LE	HRW	PEETZ	CO	80747	62
LE	HRW	SIDNEY	NE	69162	63
LE	HRW	SIDNEY	NE	69162	64
LE	HRW	GURLEY	NE	69141	69
LE	HRW	GOODLAND	KS	67735	69
LE	HRW	KIMBALL	NE	69145	69
LE	HRW	PEETZ	CO	80747	74
SKIN	HRW	KIMBALL	NE	69145	68
SKIN	HRW	HEMINGFORD	NE	69348	70
SKIN	HRW	ALLIANCE	NE	69301	72
SKIN	HRW	ALLIANCE	NE	69301	72
FE	HRS	BINFORD	ND	58416	96
FE-86	HRS	GRAFTON	ND	58237	69
FE-86	HRS	BINFORD	ND	58416	76
FE-86	HRS	GRAFTON	ND	58237	78
FE-86	HRS	CARRINGTON	ND	58421	80
FE-86	HRS	LARIMORE	ND	58251	82
FE-86	HRS	HUNTER	ND	58048	83
FE-86	HRS	CARRINGTON	ND	58421	84
FE-86	HRS	KARLSTAD	MN	56732	84
FE-86	HRS	FORMAN	ND	58032	85
FE-86	HRS	KARLSTAD	MN	56732	86
FE-86	HRS	ST-HILAIRE	MN	56554	87
FE-86	HRS	KARLSTAD	MN	56732	87
FE-86	HRS	PLENTYWOOD	MT	59254	88
FE-86	HRS	COLFAX	ND	58018	88
FE-86	HRS	JAMESTOWN	ND	58401	88
FE-86	HRS	KARLSTAD	MN	56732	89
FE-86	HRS	ALSEN	ND	58311	90
FE-86	HRS	CARRINGTON	ND	58421	90
FE-86	HRS	ST-HILAIRE	MN	56554	90

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
BUTTE-86	HRS	BINFORD	ND	58416	90
BUTTE-86	HRS	NECHE	ND	58265	91
BUTTE-86	HRS	TOLLEY	ND	58787	92
BUTTE-86	HRS	COLFAX	ND	58018	93
BUTTE-86	HRS	CARRINGTON	ND	58421	93
BUTTE-86	HRS	CARRINGTON	ND	58421	93
BUTTE-86	HRS	NECHE	ND	58265	94
BUTTE-86	HRS	HUNTER	ND	58048	94
BUTTE-86	HRS	CARRINGTON	ND	58421	95
BUTTE-86	HRS	STIRUM	ND	58069	95
BUTTE-86	HRS	FORMAN	ND	58032	95
BUTTE-86	HRS	COLFAX	ND	58018	96
BUTTE-86	HRS	HUNTER	ND	58048	97
BUTTE-86	HRS	NECHE	ND	58265	98
CALDWELL	SRW	PETTIS-CO	MO	65334	14
CALDWELL	SRW	PETTIS-CO	MO	65334	21
CALDWELL	SRW	CHERRYVALE	KS	67335	21
CALDWELL	SRW	CROTON	OH	43013	21
CALDWELL	SRW	CHERRYVALE	KS	67335	21
CALDWELL	SRW	TRENTON	MO	64683	21
CALDWELL	SRW	BUTLER	OH	44822	21
CALDWELL	SRW	S-CHARLESTON	OH	45368	21
CALDWELL	SRW	BUTLER	OH	44822	21
CALDWELL	SRW	SALINE-CO	MO	65340	21
CALDWELL	SRW	S-CHARLESTON	OH	45368	21
CALDWELL	SRW	PATASKALA	OH	43062	21
CALDWELL	SRW	NEWARK	OH	43093	21
CALDWELL	SRW	TRENTON	MO	64683	30
CALDWELL	SRW	TRENTON	MO	64683	30
CALDWELL	SRW	S-CHARLESTON	OH	45368	31
CALDWELL	SRW	TRENTON	MO	64683	31
CALDWELL	SRW	WAYLAND	MO	63472	32
CALDWELL	SRW	AFTON	OK	74331	32
CALDWELL	SRW	TRENTON	MO	64683	32
CALDWELL	SRW	TRENTON	MO	64683	32
CARDINAL	SRW	S-CHARLESTON	OH	45368	21
CARDINAL	SRW	PREBLE	OH	45347	22
CARDINAL	SRW	S-CHARLESTON	OH	45368	23
CARDINAL	SRW	PREBLE	OH	45347	24
CARSON	HRW	LIMON	CO	80828	65
CARSON	HRW	OTIS	CO	80743	68
CELTIC	HRS	LARIMORE	ND	58251	80
CELTIC	HRS	HALLOCK	MN	56728	81
CENTURA	HRW	ALLIANCE	NE	69301	51
CENTURA	HRW	ALLIANCE	NE	69301	53
CENTURA	HRW	ALLIANCE	NE	69301	55
CENTURA	HRW	DIX	NE	69133	56
CENTURA	HRW	CHAPPELL	NE	69129	59
CENTURA	HRW	CHAPPELL	NE	69129	59
CENTURA	HRW	GURLEY	NE	69141	62
CENTURA	HRW	GURLEY	NE	69141	63

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
CENTURA	HRW	SIDNEY	NE	69162	64
CENTURA	HRW	GORDON	NE	69343	64
CENTURA	HRW	VENANGO	NE	69168	64
CENTURA	HRW	VENANGO	NE	69168	66
CENTURA	HRW	CHAPPELL	NE	69129	71
CENTURA	HRW	GURLEY	NE	69141	72
CENTURA	HRW	HEMINGFORD	NE	69348	73
CENTURA	HRW	GURLEY	NE	69141	73
CENTURA	HRW	KIMBALL	NE	69145	73
CENTURA	HRW	GURLEY	NE	69141	79
CENTURK	HRW	SIDNEY	NE	69162	54
CENTURK	HRW	GURLEY	NE	69141	57
CENTURK	HRW	KIMBALL	NE	69145	76
CENTURK-78	HRW	GURLEY	NE	69141	64
CENTURK-78	HRW	SEWARD	KS	67577	64
CENTURK-78	HRW	DIX	NE	69133	70
CENTURK-78	HRW	SIDNEY	NE	69162	73
CHENEY	HRW	GENESE	KS	67444	72
CHEYENNE	HRW	VENANGO	NE	69168	61
CHISHOLM	HRW	STILLWATER	OK	74076	33
CHISHOLM	HRW	WOODWARD	OK	73801	34
CHISHOLM	HRW	KINGFISHER	OK	73750	35
CHISHOLM	HRW	BISON	OK	73720	36
CHISHOLM	HRW	PONCA-CITY	OK	74601	36
CHISHOLM	HRW	KINGFISHER	OK	73750	38
CHISHOLM	HRW	KINGFISHER	OK	73750	38
CHISHOLM	HRW	STILLWATER	OK	74076	38
CHISHOLM	HRW	PONCA-CITY	OK	74601	40
CHISHOLM	HRW	WOODWARD	OK	73801	40
CHISHOLM	HRW	WOODWARD	OK	73802	40
CHISHOLM	HRW	WEATHERFORD	OK	73096	40
CHISHOLM	HRW	HARDTNER	KS	67057	40
CHISHOLM	HRW	FREDERICK	OK	73542	40
CHISHOLM	HRW	PONCA-CITY	OK	74601	40
CHISHOLM	HRW	BISON	OK	73720	40
CHISHOLM	HRW	STILLWATER	OK	74076	40
CHISHOLM	HRW	KINGFISHER	OK	73750	41
CHISHOLM	HRW	PONCA-CITY	OK	74601	41
CHISHOLM	HRW	PONCA-CITY	OK	74601	41
CHISHOLM	HRW	BISON	OK	73720	41
CHISHOLM	HRW	BISON	OK	73720	41
CHISHOLM	HRW	WOODWARD	OK	73801	41
CHISHOLM	HRW	CHICKASHA	OK	73015	41
CHISHOLM	HRW	FREDERICK	OK	73542	41
CHISHOLM	HRW	MEDFORD	OK	73759	42
CHISHOLM	HRW	STILLWATER	OK	74076	42
CHISHOLM	HRW	KINGFISHER	OK	73750	42
CHISHOLM	HRW	WEATHERFORD	OK	73096	42
CHISHOLM	HRW	PONCA-CITY	OK	74601	42
CHISHOLM	HRW	STILLWATER	OK	74076	42
CHISHOLM	HRW	STILLWATER	OK	74076	43

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNE
CHISHOLM	HRW	FREDERICK	OK	73542	43
CHISHOLM	HRW	PONCA-CITY	OK	74601	43
CHISHOLM	HRW	BISON	OK	73720	43
CHISHOLM	HRW	CHICKASHA	OK	73015	43
CHISHOLM	HRW	CHICKASHA	OK	73015	43
CHISHOLM	HRW	STILLWATER	OK	74076	43
CHISHOLM	HRW	FREDERICK	OK	73542	43
CHISHOLM	HRW	WEATHERFORD	OK	73096	43
CHISHOLM	HRW	BISON	OK	73720	43
CHISHOLM	HRW	WEATHERFORD	OK	73096	43
CHISHOLM	HRW	WOODWARD	OK	73802	43
CHISHOLM	HRW	AFTON	OK	74331	44
CHISHOLM	HRW	KINGFISHER	OK	73750	44
CHISHOLM	HRW	PONCA-CITY	OK	74601	44
CHISHOLM	HRW	WOODWARD	OK	73802	44
CHISHOLM	HRW	BISON	OK	73720	44
CHISHOLM	HRW	FREDERICK	OK	73542	44
CHISHOLM	HRW	FREDERICK	OK	73542	44
CHISHOLM	HRW	KINGFISHER	OK	73750	44
CHISHOLM	HRW	BISON	OK	73720	44
CHISHOLM	HRW	FREDERICK	OK	73542	44
CHISHOLM	HRW	FREDERICK	OK	73542	44
CHISHOLM	HRW	STILLWATER	OK	74076	44
CHISHOLM	HRW	KINGFISHER	OK	73750	45
CHISHOLM	HRW	AFTON	OK	74331	45
CHISHOLM	HRW	AFTON	OK	74331	45
CHISHOLM	HRW	MEDFORD	OK	73759	45
CHISHOLM	HRW	CHICKASHA	OK	73015	45
CHISHOLM	HRW	BISON	OK	73720	46
CHISHOLM	HRW	CHICKASHA	OK	73015	47
CHISHOLM	HRW	CHICKASHA	OK	73015	47
CHISHOLM	HRW	WEATHERFORD	OK	73096	47
CHISHOLM	HRW	CHICKASHA	OK	73015	47
CHISHOLM	HRW	BISON	OK	73720	48
CHISHOLM	HRW	CHICKASHA	OK	73015	48
CHISHOLM	HRW	MEDFORD	OK	73759	48
CHISHOLM	HRW	PONCA-CITY	OK	74601	48
CHISHOLM	HRW	AFTON	OK	74331	48
CHISHOLM	HRW	WOODWARD	OK	73801	48
CHISHOLM	HRW	AFTON	OK	74331	48
CHISHOLM	HRW	WEATHERFORD	OK	73096	51
CHISHOLM	HRW	STILLWATER	OK	74076	51
CHISHOLM	HRW	CHICKASHA	OK	73015	51
CHISHOLM	HRW	KINGFISHER	OK	73750	51
CHISHOLM	HRW	AFTON	OK	74331	51
CHISHOLM	HRW	WEATHERFORD	OK	73096	51
CHISHOLM	HRW	WEATHERFORD	OK	73096	51
CHISHOLM	HRW	PONCA-CITY	OK	74601	51
CHISHOLM	HRW	AFTON	OK	74331	51
CHISHOLM	HRW	WEATHERFORD	OK	73096	51
CHISHOLM	HRW	AFTON	OK	74331	51

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
CHISHOLM	HRW	CHICKASHA	OK	73015	52
CHISHOLM	HRW	WEATHERFORD	OK	73096	53
CHISHOLM	HRW	AFTON	OK	74331	56
CHISHOLM	HRW	WOODWARD	OK	73802	58
CHISHOLM	HRW	KINGFISHER	OK	73750	59
CHISHOLM	HRW	WOODWARD	OK	73801	60
CHISHOLM	HRW	AFTON	OK	74331	64
CHISHOLM	HRW	STILLWATER	OK	74076	67
CHISHOLM	HRW	WOODWARD	OK	73801	71
CODY	HRW	GORDON	NE	69343	45
CODY	HRW	CHAPPELL	NE	69129	51
CODY	HRW	VENANGO	NE	69168	60
CODY	HRW	KIMBALL	NE	69145	62
CODY	HRW	HEMINGFORD	NE	69348	69
COLT	HRW	ALLIANCE	NE	69301	46
COLT	HRW	ALLIANCE	NE	69301	46
COLT	HRW	SIDNEY	NE	69162	47
COLT	HRW	ALLIANCE	NE	69301	47
COLT	HRW	CHAPPELL	NE	69129	48
COLT	HRW	SIDNEY	NE	69162	58
COLT	HRW	HEMINGFORD	NE	69348	59
COLT	HRW	VENANGO	NE	69168	62
COLT	HRW	PHILLIPSBURG	KS	67661	62
COLUMBUS	HRS	BINFORD	ND	58416	71
COLUMBUS	HRS	BINFORD	ND	58416	84
COLUMBUS	HRS	CARRINGTON	ND	58421	87
COLUMBUS	HRS	CARRINGTON	ND	58421	88
COLUMBUS	HRS	TOLLEY	ND	58787	103
CONCHO	HRW	STILLWATER	OK	74076	36
CONCHO	HRW	STILLWATER	OK	74076	39
CONCHO	HRW	STILLWATER	OK	74076	39
CONCHO	HRW	STILLWATER	OK	74076	40
CONCHO	HRW	STILLWATER	OK	74076	40
CONCHO	HRW	SEWARD	KS	67577	66
COTEAU	HRS	RALEIGH	ND	58564	81
COTEAU	HRS	REGAN	ND	58477	82
COTEAU	HRS	REGAN	ND	58477	86
COTEAU	HRS	REGAN	ND	58477	87
COTEAU	HRS	BEULAH	ND	58523	89
COTEAU	HRS	CARSON	ND	58529	91
COTEAU	HRS	FLASHER	ND	58535	91
COTEAU	HRS	TOLLEY	ND	58787	93
COTEAU	HRS	TOLLEY	ND	58787	94
COTEAU	HRS	REGAN	ND	58477	96
CREE	HRW	BROADVIEW	MT	59015	63
CUTLESS	HRS	PLENTYWOOD	MT	59254	81
DODGE	HRW	KINGMAN	KS	67068	61
DYNASTY	SRW	S-CHARLESTON	OH	45368	23
EAGLE	HRW	OAKLEY	KS	67748	67
EAGLE	HRW	STANTON-CO	KS	67855	68
EAGLE	HRW	COLDWATER	KS	67029	68

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
EAGLE	HRW	JETMORE	KS	67854	69
EAGLE	HRW	BREWSTER	KS	67732	73
EAGLE	HRW	LEOTI	KS	67861	78
EAGLE	HRW	LEOTI	KS	67861	79
EAGLE	HRW	OAKLEY	KS	67748	80
FORTUNA	HRS	DUTTON	MT	59433	81
FS402	SRW	S-CHARLESTON	OH	45368	25
FS402	SRW	S-CHARLESTON	OH	45368	25
GARST	HRW	GOODLAND	KS	67735	65
GARST-HR48	HRW	RYUS	KS	67870	73
GARST-HR64	HRW	ONAGA	KS	66521	62
GARST-HR64	HRW	LINCOLN	KS	67455	76
GENIE-II	SRW	TRENTON	MO	64683	29
GLENMAN	HRS	DODSON	MT	59524	63
GLENMAN	HRS	SHELBY	MT	59474	81
GLENMAN	HRS	DUTTON	MT	59433	81
GR860	SRW	S-CHARLESTON	OH	45368	25
GR860	SRW	S-CHARLESTON	OH	45368	25
GR876	SRW	S-CHARLESTON	OH	45368	26
GR876	SRW	S-CHARLESTON	OH	45368	30
GUARD	HRS	ST-HILAIRE	MN	56554	74
GUARD	HRS	HAWLEY	MN	56549	75
GUERT-2	HRW	DODSON	MT	59524	64
HAIL	HRW	PEETZ	CO	80747	58
HART	SRW	COLUMBUS	OH	43201	30
HAWK	HRW	GORDON	NE	69343	52
HAWK	HRW	PEETZ	CO	80747	53
HAWK	HRW	GORDON	NE	69343	54
HAWK	HRW	ANTHONY	KS	67003	55
HAWK	HRW	MINNEAPOLIS	KS	67467	56
HAWK	HRW	GURLEY	NE	69141	58
HAWK	HRW	OAKLEY	KS	67748	61
HAWK	HRW	IDALIA	CO	80735	61
HAWK	HRW	PEETZ	CO	80747	61
HAWK	HRW	ST-JOHN	KS	67576	62
HAWK	HRW	BREWSTER	KS	67732	64
HAWK	HRW	STANTON-CO	KS	67855	64
HAWK	HRW	BREWSTER	KS	67732	65
HAWK	HRW	LEOTI	KS	67861	65
HAWK	HRW	SIDNEY	NE	69162	66
HAWK	HRW	OTIS	CO	80743	66
HAWK	HRW	COLDWATER	KS	67029	67
HAWK	HRW	SUBLETTE	KS	67877	68
HAWK	HRW	LANE-CO	KS	67839	68
HAWK	HRW	DALTON	NE	69131	68
HAWK	HRW	HUTCHINSON	KS	67504	69
HAWK	HRW	CUNNINGHAM	KS	67035	70
HAWK	HRW	GURLEY	NE	69141	70
HAWK	HRW	LIMON	CO	80828	70
HAWK	HRW	KANORADO	KS	67741	71
HAWK	HRW	DILLWYN	KS	67557	71

3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
✓	HRW	SEWARD	KS	67577	71
✓	HRW	LANE-CO	KS	67839	72
✓	HRW	SUBLETTE	KS	67877	73
✓	HRW	JETMORE	KS	67854	74
✓	HRW	SUBLETTE	KS	67877	74
✓	HRW	HUGOTON	KS	67951	74
✓	HRW	COPE	CO	80812	75
✓	HRW	BLUE-RAPIDS	KS	66411	75
✓	HRW	LEOTI	KS	67861	75
✓	HRW	JETMORE	KS	67854	77
✓	HRW	SATANTA	KS	67870	77
✓	HRW	SUBLETTE	KS	67877	79
3SIC	HWW	DIXON	CA	95620	62
3SIC	HWW	DIXON	CA	95620	62
3SIC	HWW	DIXON	CA	95620	64
3SIC	HWW	DIXON	CA	95620	64
3SIC	HWW	DIXON	CA	95620	65
3SIC	HWW	DIXON	CA	95620	68
3SIC	HWW	DIXON	CA	95620	68
CER	HRW	SIDNEY	NE	69162	71
CER	HRW	HEMINGFORD	NE	69348	78
NED	HRW	GOODLAND	KS	67735	62
NED	HRW	LEOTI	KS	67861	64
NED	HRW	PARK	KS	67751	65
NED	HRW	LEOTI	KS	67861	66
NED	HRW	PHILLIPSBURG	KS	67661	68
NED	HRW	LIMON	CO	80828	69
NED	HRW	LEOTI	KS	67861	69
NED	HRW	LEOTI	KS	67861	69
NED	HRW	OAKLEY	KS	67748	69
NED	HRW	OAKLEY	KS	67748	70
NED	HRW	OAKLEY	KS	67748	71
NED	HRW	PARK	KS	67751	71
NED	HRW	SCOTT-CITY	KS	67871	
NED	HRW	SCOTT-CITY	KS	67871	
NED	HRW	JETMORE			
NED	HRW	PARK			
NED	HRW	KANO			
NED	HRW	LANE			
NED	HRW	BREW			
NED	HRW	LEOT			
NED	HRW	LEOT			
NED	HRW	LANE			
	HRS	BINF			
	HRS	BINF			
	HRS	LARK			
	HRS	JAME			
	HRS	BINF			
	HRS	COLF			
	HRS	REGA			
	HRS	RALE			

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
LEN	HRS	TOLLEY	ND	58787	83
LEN	HRS	REGAN	ND	58477	85
LEN	HRS	REGAN	ND	58477	85
LEN	HRS	TOLLEY	ND	58787	86
LEN	HRS	CARRINGTON	ND	58421	87
LEN	HRS	GWINNER	ND	58040	88
LEN	HRS	BINFORD	ND	58416	90
LEN	HRS	STIRUM	ND	58069	90
LEN	HRS	CARRINGTON	ND	58421	90
LEN	HRS	REGAN	ND	58477	92
LOGAN	SRW	PORTAGE	OH	43451	24
LOGAN	SRW	MAHONING	OH	44609	26
MARSHALL	HRS	WARROAD	MN	56763	61
MARSHALL	HRS	WARROAD	MN	56763	64
MARSHALL	HRS	WARROAD	MN	56763	64
MARSHALL	HRS	WARROAD	MN	56763	68
MARSHALL	HRS	WARROAD	MN	56763	70
MARSHALL	HRS	HAWLEY	MN	56549	70
MARSHALL	HRS	HANCOCK	MN	56244	70
MARSHALL	HRS	WARROAD	MN	56763	71
MARSHALL	HRS	WARROAD	MN	56763	71
MARSHALL	HRS	HUNTER	ND	58048	71
MARSHALL	HRS	LARIMORE	ND	58251	71
MARSHALL	HRS	KARLSTAD	MN	56732	71
MARSHALL	HRS	ARGYLE	MN	56713	74
MARSHALL	HRS	KARLSTAD	MN	56732	74
MARSHALL	HRS	ELDER	MN	56523	75
MARSHALL	HRS	ARGYLE	MN	56713	76
MARSHALL	HRS	LARIMORE	ND	58251	76
MARSHALL	HRS	KARLSTAD	MN	56732	76
MARSHALL	HRS	ELDER	MN	56523	77
MARSHALL	HRS	HANCOCK	MN	56244	77
MARSHALL	HRS	KARLSTAD	MN	56732	77
MARSHALL	HRS	LARIMORE	ND	58251	78
MARSHALL	HRS	ST-HILAIRE	MN	56554	78
MARSHALL	HRS	HAWLEY	MN	56549	78
MARSHALL	HRS	CYRUS	MN	56322	78

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
MARSHALL	HRS	ELDER	MN	56523	83
MARSHALL	HRS	ARGYLE	MN	56713	83
MARSHALL	HRS	ELDER	MN	56523	85
MARSHALL	HRS	BEULAH	ND	58523	85
MARSHALL	HRS	NECHE	ND	58265	86
MARSHALL	HRS	ST-HILAIRE	MN	56554	86
MARSHALL	HRS	ELDER	MN	56523	86
MARSHALL	HRS	HAWLEY	MN	56549	86
MARSHALL	HRS	ELDER	MN	56523	87
MARSHALL	HRS	NECHE	ND	58265	87
MARSHALL	HRS	HAWLEY	MN	56549	89
MARSHALL	HRS	NECHE	ND	58265	89
MARSHALL	HRS	BEULAH	ND	58523	89
MARSHALL	HRS	ARGYLE	MN	56713	89
MARSHALL	HRS	ST-HILAIRE	MN	56554	90
MARSHALL	HRS	HALLOCK	MN	56728	91
MARSHALL	HRS	HALLOCK	MN	56728	92
MARSHALL	HRS	ELDER	MN	56523	94
MARSHALL	HRS	HALLOCK	MN	56728	97
MARSHALL	HRS	GRAFTON	ND	58237	97
MESA	HRW	OTIS	CO	80743	65
MESA	HRW	RYUS	KS	67870	71
MESA	HRW	SUBLETTE	KS	67877	74
MUSTANG	HRW	WEATHERFORD	OK	73096	52
MUSTANG	HRW	OTIS	CO	80743	52
MUSTANG	HRW	IDALIA	CO	80735	53
MUSTANG	HRW	ANTHONY	KS	67003	53
MUSTANG	HRW	WELLINGTON	KS	67152	56
MUSTANG	HRW	BLUFF-CITY	KS	67018	58
MUSTANG	HRW	PONCA-CITY	OK	74601	60
MUSTANG	HRW	COLDWATER	KS	67029	60
MUSTANG	HRW	GOODLAND	KS	67735	60
MUSTANG	HRW	WEATHERFORD	OK	73096	61
MUSTANG	HRW	TAM			
MUSTANG	HRW	ED			
MUSTANG	HRW				

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
MUSTANG	HRW	JETMORE	KS	67854	73
MUSTANG	HRW	MANHATTAN	KS	66502	75
MUSTANG	HRW	HUGOTON	KS	67951	75
MUSTANG	HRW	HUGOTON	KS	67951	82
McNAIR-1003	SRW	PRESCOTT	KS	66767	25
NEWANA	HRS	DODSON	MT	59524	71
NEWANA	HRS	GREAT-FALLS	MT	59404	72
NEWANA	HRS	GREAT-FALLS	MT	59404	78
NEWANA	HRS	THREE-FORKS	MT	59752	79
NEWTON	HRW	GENESEO	KS	67444	52
NEWTON	HRW	CANTON	KS	67428	52
NEWTON	HRW	SEWARD	KS	67577	53
NEWTON	HRW	GENESEO	KS	67444	56
NEWTON	HRW	LONGFORD	KS	67458	56
NEWTON	HRW	PARK	KS	67751	56
NEWTON	HRW	GENESEO	KS	67444	56
NEWTON	HRW	PARK	KS	67751	56
NEWTON	HRW	ASHERVILLE	KS	67420	56
NEWTON	HRW	PARK	KS	67751	57
NEWTON	HRW	HOLTON	KS	66436	57
NEWTON	HRW	LONGFORD	KS	67458	57
NEWTON	HRW	TAMPA	KS	67483	57
NEWTON	HRW	OTIS	CO	80743	57
NEWTON	HRW	ONAGA	KS	66521	58
NEWTON	HRW	BREWSTER	KS	67732	58
NEWTON	HRW	PARK	KS	67751	60
NEWTON	HRW	CUNNINGHAM	KS	67035	60
NEWTON	HRW	KANORADO	KS	67741	60
NEWTON	HRW	SEWARD	KS	67577	60
NEWTON	HRW	BLUE-RAPIDS	KS	66411	61
NEWTON	HRW	HOLTON	KS	66436	61
NEWTON	HRW	ST-JOHN	KS	67576	61
NEWTON	HRW	ONAGA	KS	66521	61
NEWTON	HRW	BLUE-RAPIDS	KS	66411	61
NEWTON	HRW	BREWSTER	KS	67732	61
NEWTON	HRW	MANHATTAN	KS	66502	61
NEWTON	HRW	LANE-CO	KS	67839	62
NEWTON	HRW	OAKLEY	KS	67748	62
NEWTON	HRW	SEWARD	KS	67577	62
NEWTON	HRW	ONAGA	KS	66521	62
NEWTON	HRW	BLUE-RAPIDS	KS	66411	63
NEWTON	HRW	STANTON-CO	KS	67855	63
NEWTON	HRW	HUGOTON	KS	67951	63
NEWTON	HRW	SEWARD	KS	67577	63
NEWTON	HRW	TAMPA	KS	67483	63
NEWTON	HRW	GOODLAND	KS	67735	64
NEWTON	HRW	OTIS	CO	80743	64
NEWTON	HRW	DILLWYN	KS	67557	64
NEWTON	HRW	GOODLAND	KS	67735	64
NEWTON	HRW	GOODLAND	KS	67735	65
NEWTON	HRW	HOLTON	KS	66436	65

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
NEWTON	HRW	GOODLAND	KS	67735	65
NEWTON	HRW	JETMORE	KS	67854	65
NEWTON	HRW	MANHATTAN	KS	66502	66
NEWTON	HRW	LECTI	KS	67861	66
NEWTON	HRW	PHILLIPSBURG	KS	67661	67
NEWTON	HRW	MINNEAPOLIS	KS	67467	69
NEWTON	HRW	BLUE-RAPIDS	KS	66411	70
NEWTON	HRW	PHILLIPSBURG	KS	67661	74
NEWTON	HRW	MINNEAPOLIS	KS	67467	76
NEWTON	HRW	ONAGA	KS	66521	76
NEWTON	HRW	HIAWATHA	KS	66434	77
NK-711	HRS	ST-HILAIRE	MN	56554	79
NK-812	HRW	FREDERICK	OK	73542	79
NK-812	HRW	FREDERICK	OK	73542	85
NK-830	HRW	LINCOLN	KS	67455	76
NK-830	HRW	LINCOLN	KS	67455	78
NORKAN	HRW	WHITE-CLOUD	KS	66094	55
NORKAN	HRW	VENANGO	NE	69168	59
NORKAN	HRW	PHILLIPSBURG	KS	67661	66
NORKAN	HRW	WHITE-CLOUD	KS	66094	69
NORSEMAN	HRS	GRAFTON	ND	58237	68
NORSEMAN	HRS	GRAFTON	ND	58237	96
NORSEMAN	HRS	GRAFTON	ND	58237	103
NORSEMAN	HRS	ALSEN	ND	58311	104
NORSTAR	HRW	DODSON	MT	59524	64
PARKER	HRW	CHANUTE	KS	66720	64
PARKER	HRW	CHANUTE	KS	66720	73
PIKE	SRW	SALINE-CO	MO	65340	7
PIKE	SRW	PETTIS-CO	MO	65334	13
PIKE	SRW	SALINE-CO	MO	65340	13
PIKE	SRW	SALINE-CO	MO	65340	14
PIKE	SRW	SALINE-CO	MO	65340	15
PIKE	SRW	TRENTON	MO	64683	19
PIKE	SRW	TRENTON	MO	64683	21
PIKE	SRW	BUTLER	OH	44822	20
PIONEER	SRW	PORTAGE	OH	43451	23
PIONEER	SRW	PLEASANTVILLE	OH	43148	32
PIONEER	HRW	PONCA-CITY	OK	74601	49
PIONEER	HRW	GOODLAND	KS	67735	53
PIONEER	HRW	CANTON	KS	67428	53
PIONEER	HRW	PONCA-CITY	OK	74601	58
PIONEER	HRW	KINGFISHER	OK	73750	61
PIONEER	HRW	KINGFISHER	OK	73750	61
PIONEER	HRW	AFTON	OK	74331	66
PIONEER	HRW	AFTON	OK	74331	72
PIONEER	HRW	ELDER	MN	56523	88
PIONEER	HRW	TOLLEY	ND	58787	89
PIONEER	HRW	TOLLEY	ND	58018	97
PIONEER-17707	HRS	COLFAX	OK	73096	47
PIONEER-2157	HRW	WEATHERFORD	OK	73801	49
PIONEER-2157	HRW	WOODWARD	OK	73801	49
PIONEER-2157	HRW	AFTON	OK	74331	50

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
PIONEER-2157	HRW	MEDFORD	OK	73759	50
PIONEER-2157	HRW	ANTHONY	KS	67003	51
PIONEER-2157	HRW	AFTON	OK	74331	51
PIONEER-2157	HRW	CANTON	KS	67428	51
PIONEER-2157	HRW	PONCA-CITY	OK	74601	54
PIONEER-2157	HRW	CHICKASHA	OK	73015	54
PIONEER-2157	HRW	WOODWARD	OK	73801	54
PIONEER-2157	HRW	BLUFF-CITY	KS	67018	55
PIONEER-2157	HRW	HARDTNER	KS	67057	55
PIONEER-2157	HRW	STILLWATER	OK	74076	56
PIONEER-2157	HRW	MINNEAPOLIS	KS	67467	56
PIONEER-2157	HRW	MEDFORD	OK	73759	57
PIONEER-2157	HRW	BLUFF-CITY	KS	67018	57
PIONEER-2157	HRW	MEDFORD	OK	73759	57
PIONEER-2157	HRW	WEATHERFORD	OK	73096	58
PIONEER-2157	HRW	CHICKASHA	OK	73015	58
PIONEER-2157	HRW	LORRAINE	KS	67459	58
PIONEER-2157	HRW	CHICKASHA	OK	73015	58
PIONEER-2157	HRW	WOODWARD	OK	73801	58
PIONEER-2157	HRW	KINGFISHER	OK	73750	58
PIONEER-2157	HRW	BISON	OK	73720	60
PIONEER-2157	HRW	STILLWATER	OK	74076	60
PIONEER-2157	HRW	BISON	OK	73720	60
PIONEER-2157	HRW	PONCA-CITY	OK	74601	60
PIONEER-2157	HRW	MEDFORD	OK	73759	60
PIONEER-2157	HRW	LORRAINE	KS	67459	61
PIONEER-2157	HRW	STILLWATER	OK	74076	61
PIONEER-2157	HRW	KINGFISHER	OK	73750	61
PIONEER-2157	HRW	KINGFISHER	OK	73750	61
PIONEER-2157	HRW	LANE-CO	KS	67839	61
PIONEER-2157	HRW	WELLINGTON	KS	67152	61
PIONEER-2157	HRW	PONCA-CITY	OK	74601	61
PIONEER-2157	HRW	CHICKASHA	OK	73015	62
PIONEER-2157	HRW	STILLWATER	OK	74076	62
PIONEER-2157	HRW	STILLWATER	OK	74076	62
PIONEER-2157	HRW	WOODWARD	OK	73801	62
PIONEER-2157	HRW	PONCA-CITY	OK	74601	63
PIONEER-2157	HRW	CHICKASHA	OK	73015	64
PIONEER-2157	HRW	BISON	OK	73720	64
PIONEER-2157	HRW	MEDFORD	OK	73759	64
PIONEER-2157	HRW	WEATHERFORD	OK	73096	64
PIONEER-2157	HRW	LORRAINE	KS	67459	65
PIONEER-2157	HRW	JETMORE	KS	67854	65
PIONEER-2157	HRW	WELLINGTON	KS	67152	66
PIONEER-2157	HRW	WEATHERFORD	OK	73096	66
PIONEER-2157	HRW	BISON	OK	73720	66
PIONEER-2157	HRW	MEDFORD	OK	73759	66
PIONEER-2157	HRW	BISON	OK	73720	67
PIONEER-2157	HRW	WEATHERFORD	OK	73096	69
PIONEER-2157	HRW	WOODWARD	OK	73801	72
PIONEER-2165	HRW	LORRAINE	KS	67459	66

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
PIONEER-2165	HRW	TAMPA	KS	67483	67
PIONEER-2172	HRW	BLUFF-CITY	KS	67018	57
PIONEER-2172	HRW	WELLINGTON	KS	67152	75
PIONEER-2369	HRS	LARIMORE	ND	58251	90
PIONEER-2369	HRS	ALSEN	ND	58311	90
PIONEER-2369	HRS	HALLOCK	MN	56728	95
PIONEER-2385	HRS	CYRUS	MN	56323	76
PIONEER-2385	HRS	HALLOCK	MN	56728	81
PIONEER-2385	HRS	JAMESTOWN	ND	58401	81
PIONEER-2385	HRS	ALSEN	ND	58311	81
PIONEER-2385	HRS	CYRUS	MN	56323	85
PIONEER-2385	HRS	COLFAX	ND	58018	86
PIONEER-2550	SRW	DELAWARE	OH	43015	22
PIONEER-5757	HRW	TAMPA	KS	67483	55
PIONEER-5757	HRW	TAMPA	KS	67483	58
PLAINSMAN	HRW	WELLINGTON	KS	67152	67
PRO-BRAND-830	HRW	MANCHESTER	KS	67463	61
PRO-BRAND-830	HRW	HIAWATHA	KS	66434	64
PRO-BRAND-830	HRW	OSAGE-CITY	KS	66523	65
PRO-BRAND-830	HRW	MINNEAPOLIS	KS	67467	65
PRO-BRAND-830	HRW	LORRAINE	KS	67459	69
PRO-BRAND-830	HRW	ASHERVILLE	KS	67420	70
PRO-BRAND-830	HRW	CANTON	KS	67428	72
PRO-BRAND-830	HRW	LONGFORD	KS	67458	72
PRO-BRAND-830	HRW	ASHERVILLE	KS	67420	73
PRO-BRAND-830	HRW	PRESCOTT	KS	66767	74
PRO-BRAND-830	HRW	PRESCOTT	KS	66767	76
QUANTUM	HRW	RYUS	KS	67870	60
REDLAND	HRW	VENANGO	NE	69168	47
REDLAND	HRW	GURLEY	NE	69141	62
REDLAND	HRW	GURLEY	NE	69141	64
REDLAND	HRW	HEMINGFORD	NE	69348	69
REDWIN	HRW	THREE-FORKS	MT	59752	82
ROCKY	HRW	SIDNEY	NE	69162	76
ROCKY	HRW	HARDTNER	KS	67057	77
SAGE	HRW	GORDON	NE	69343	43
SAGE	HRW	COLDWATER	KS	67029	68
SANDY	HRW	PIERCE	CO	80650	51
SANDY	HRW	PIERCE	CO	80650	52
SANDY	HRW	PIERCE	CO	80650	56
SANDY	HRW	PIERCE	CO	80650	57
SANDY	HRW	PIERCE	CO	80650	59
SANDY	HRW	PIERCE	CO	80650	64
SANDY	HRW	PIERCE	CO	80650	65
SANDY	HRW	PIERCE	CO	80650	65
SANDY	HRW	PIERCE	CO	80650	65
SANDY	HRW	PIERCE	CO	80650	65
SANDY	HRW	PIERCE	CO	80650	66
SANDY	HRW	PEETZ	CO	80747	66
SANDY	HRW	PIERCE	CO	80650	66
SANDY	HRW	PIERCE	CO	80650	67
SANDY	HRW	PIERCE	CO	80650	68

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
SANDY	HRW	PIERCE	CO	80650	68
SANDY	HRW	PIERCE	CO	80650	71
SANDY	HRW	ARRIBA	CO	80804	72
SANDY	HRW	STANTON-CO	KS	67855	73
SCOTTY	SRW	LANCASTER	OH	43130	28
SCOUT	HRW	DIX	NE	69133	57
SCOUT	HRW	PEETZ	CO	80747	63
SCOUT	HRW	RYUS	KS	67870	68
SCOUT-66	HRW	GORDON	NE	69343	49
SCOUT-66	HRW	GORDON	NE	69343	51
SCOUT-66	HRW	GORDON	NE	69343	58
SCOUT-66	HRW	IDALIA	CO	80735	62
SCOUT-66	HRW	GORDON	NE	69343	62
SCOUT-66	HRW	KIMBALL	NE	69145	63
SCOUT-66	HRW	IDALIA	CO	80735	65
SCOUT-66	HRW	GOODLAND	KS	67735	67
SCOUT-66	HRW	JETMORE	KS	67854	76
SCOUT-66	HRW	BREWSTER	KS	67732	77
SIOUXLAND	HRW	GORDON	NE	69343	45
SIOUXLAND	HRW	GORDON	NE	69343	46
SIOUXLAND	HRW	OSAGE-CITY	KS	66523	55
SIOUXLAND	HRW	GORDON	NE	69343	56
SIOUXLAND	HRW	OSAGE-CITY	KS	66523	57
SIOUXLAND	HRW	WOODWARD	OK	73801	59
SIOUXLAND	HRW	CHAPPELL	NE	69129	59
SIOUXLAND	HRW	WOODWARD	OK	73801	59
SIOUXLAND	HRW	GORDON	NE	69343	59
SIOUXLAND	HRW	WOODWARD	OK	73801	60
SIOUXLAND	HRW	SIDNEY	NE	69162	61
SIOUXLAND	HRW	HUTCHINSON	KS	67504	62
SIOUXLAND	HRW	DIX	NE	69133	63
SIOUXLAND	HRW	WOODWARD	OK	73802	64
SIOUXLAND	HRW	SIDNEY	NE	69162	64
SIOUXLAND	HRW	SIDNEY	NE	69162	65
SIOUXLAND	HRW	GENESE	KS	67444	66
SIOUXLAND	HRW	WOODWARD	OK	73801	67
SIOUXLAND	HRW	MINNEAPOLIS	KS	67467	67
SIOUXLAND	HRW	COLDWATER	KS	67029	68
SIOUXLAND	HRW	HEMINGFORD	NE	69348	75
SOLAR-DNS	HRS	CHCTEAU	MT	59422	82
STALLION	HRW	OTIS	CO	80743	57
STALLION	HRW	WELLINGTON	KS	67152	63
STALLION	HRW	MEDFORD	OK	73759	65
STALLION	HRW	SCOTT-CITY	KS	67871	66
STALLION	HRW	RYUS	KS	67870	70
STOA	HRS	WARROAD	MN	56763	64
STOA	HRS	RALEIGH	ND	58564	70
STOA	HRS	ST-HILAIRE	MN	56554	74
STOA	HRS	WARROAD	MN	56763	75
STOA	HRS	RALEIGH	ND	58564	76
STOA	HRS	WARROAD	MN	56763	77

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
STOA	HRS	FORMAN	ND	58032	77
STOA	HRS	LISBON	ND	58054	77
STOA	HRS	ST-HILAIRE	MN	56554	77
STOA	HRS	HUNTER	ND	58048	79
STOA	HRS	RALEIGH	ND	58564	79
STOA	HRS	RALEIGH	ND	58564	79
STOA	HRS	REGAN	ND	58477	81
STOA	HRS	JAMESTOWN	ND	58401	82
STOA	HRS	LARIMORE	ND	58251	83
STOA	HRS	HAWLEY	MN	56549	84
STOA	HRS	HAWLEY	MN	56549	84
STOA	HRS	GRAFTON	ND	58237	84
STOA	HRS	HUNTER	ND	58048	84
STOA	HRS	ST-HILAIRE	MN	56554	85
STOA	HRS	REGAN	ND	58477	85
STOA	HRS	HALLOCK	MN	56728	86
STOA	HRS	BEULAH	ND	58523	86
STOA	HRS	TOLLEY	ND	58787	86
STOA	HRS	NECHE	ND	58265	87
STOA	HRS	HUNTER	ND	58048	87
STOA	HRS	ALSEN	ND	58311	89
STOA	HRS	TOLLEY	ND	58787	89
STOA	HRS	BEULAH	ND	58523	90
STOA	HRS	GRAFTON	ND	58237	91
STOA	HRS	NECHE	ND	58265	93
STOA	HRS	HUNTER	ND	58048	93
STOA	HRS	WINNER	ND	58040	94
SUPER-HAWK	HRW	PEETZ	CO	80747	50
TAM-101	HRW	ANTHONY	KS	67003	55
TAM-101	HRW	KINGFISHER	OK	73750	58
TAM-101	HRW	KINGFISHER	OK	73750	58
TAM-101	HRW	ANTHONY	KS	67003	58
TAM-101	HRW	KINGFISHER	OK	73750	63
TAM-105	HRW	PRESCOTT	KS	66767	44
TAM-105	HRW	PRESCOTT	KS	66767	54
TAM-105	HRW	PRESCOTT	KS	66767	57
TAM-105	HRW	ASHERVILLE	KS	67420	60
TAM-105	HRW	PRESCOTT	KS	66767	64
TAM-105	HRW	PARK	KS	67751	70
TAM-105	HRW	STANTON-CO	KS	67855	77
TAM-105	HRW	LEOTI	KS	67861	77
TAM-105	HRW	LEOTI	KS	67861	78
TAM-105	HRW	LEOTI	KS	67861	79
TAM-105	HRW	LEOTI	KS	67861	82
TAM-105	HRW	OSAGE-CITY	KS	66523	82
TAM-105	HRW	COPE	CO	80812	83
TAM-105	HRW	LEOTI	KS	67861	85
TAM-105	HRW	STANTON-CO	KS	67855	78
TAM-106	HRW	LINCOLN	KS	67455	56
TAM-107	HRW	CHERRYVALE	KS	67335	57
TAM-107	HRW	IDALIA	CO	80735	66

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
TAM-107	HRW	STANTON-CO	KS	67855	68
TAM-107	HRW	VENANGO	NE	69168	73
TAM-107	HRW	LEOTI	KS	67861	76
TAM-107	HRW	PARK	KS	67751	76
TAM-107	HRW	JETMORE	KS	67854	77
TAM-107	HRW	VENANGO	NE	69168	77
TAM-107	HRW	HEMINGFORD	NE	69348	78
TAM-107	HRW	OTIS	CO	80743	79
TAM-107	HRW	LANE-CO	KS	67839	79
TAM-107	HRW	HUGO	CO	80821	80
TAM-107	HRW	VENANGO	NE	69168	81
TAM-107	HRW	OTIS	CO	80743	81
TAM-107	HRW	LEOTI	KS	67861	83
TAM-107	HRW	RYUS	KS	67870	84
TAM-107	HRW	OTIS	CO	80743	85
TAM-107	HRW	SUBLETTE	KS	67877	91
TAM-108	HRW	IDALIA	CO	80735	33
TAM-108	HRW	PEETZ	CO	80747	37
TAM-108	HRW	PRESCOTT	KS	66767	49
TAM-108	HRW	CHERRYVALE	KS	67335	50
TAM-108	HRW	DILLWYN	KS	67557	55
TAM-108	HRW	ST-JOHN	KS	67576	60
TELEMARK	HRS	KARLSTAD	MN	56732	83
TELEMARK	HRS	GRAFTON	ND	58237	90
THUNDERBIRD	HRW	GORDON	NE	69343	64
THUNDERBIRD	HRW	EUREKA	KS	67045	65
THUNDERBIRD	HRW	GORDON	NE	69343	65
THUNDERBIRD	HRW	IDALIA	CO	80735	66
THUNDERBIRD	HRW	OTIS	CO	80743	67
THUNDERBIRD	HRW	BREWSTER	KS	67732	68
THUNDERBIRD	HRW	COLDWATER	KS	67029	69
THUNDERBIRD	HRW	COLDWATER	KS	67029	71
THUNDERBIRD	HRW	HUGOTON	KS	67951	72
THUNDERBIRD	HRW	PHILLIPSBURG	KS	67661	74
THUNDERBIRD	HRW	ASHERVILLE	KS	67420	76
THUNDERBIRD	HRW	WELLINGTON	KS	67152	76
THUNDERBIRD	HRW	WHITE-CLOUD	KS	66094	79
THUNDERBIRD	HRW	HUGOTON	KS	67951	79
THUNDERBIRD	HRW	BLUE-RAPIDS	KS	66411	80
THUNDERBIRD	HRW	WHITE-CLOUD	KS	66094	80
THUNDERBIRD	HRW	SATANTA	KS	67870	81
THUNDERBIRD	HRW	BREWSTER	KS	67732	82
TITAN	SRW	COLUMBUS	OH	43201	30
TRAILBLAZER	HRW	ONAGA	KS	66521	59
TRAILBLAZER	HRW	ASHERVILLE	KS	67420	67
TRIUMPH	HRW	WEATHERFORD	OK	73096	46
TRIUMPH	HRW	BISON	OK	73720	47
TRIUMPH	HRW	WEATHERFORD	OK	73096	51
TRIUMPH	HRW	BISON	OK	73720	52
TRIUMPH	HRW	BISON	OK	73720	53
TRIUMPH	HRW	WEATHERFORD	OK	73096	54

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
TRIUMPH	HRW	BISON	OK	73720	54
TRIUMPH	HRW	KINGFISHER	OK	73750	55
TRIUMPH	HRW	BISON	OK	73720	56
TRIUMPH	HRW	CANTON	KS	67428	56
TRIUMPH	HRW	KINGMAN	KS	67068	57
TRIUMPH	HRW	EUREKA	KS	67045	57
TRIUMPH	HRW	CHANUTE	KS	66720	59
TRIUMPH	HRW	CHANUTE	KS	66720	60
TRIUMPH	HRW	ANTHONY	KS	67003	62
TRIUMPH	HRW	CHANUTE	KS	66720	70
TRIUMPH	HRW	MANHATTAN	KS	66502	75
TUT	HRW	SEWARD	KS	67577	67
VICTORY	HRW	CANTON	KS	67428	51
VICTORY	HRW	OSAGE-CITY	KS	66523	55
VICTORY	HRW	TAMPA	KS	67483	58
VICTORY	HRW	WELLINGTON	KS	67152	59
VICTORY	HRW	IDALIA	CO	80735	60
VICTORY	HRW	CHERRYVALE	KS	67335	60
VICTORY	HRW	LONGFORD	KS	67458	61
VICTORY	HRW	LORRAINE	KS	67459	61
VICTORY	HRW	KINGMAN	KS	67068	62
VICTORY	HRW	TAMPA	KS	67483	62
VICTORY	HRW	LANE-CO	KS	67839	62
VICTORY	HRW	ONAGA	KS	66521	62
VICTORY	HRW	MANHATTAN	KS	66502	62
VICTORY	HRW	EUREKA	KS	67045	63
VICTORY	HRW	HOLTON	KS	66436	63
VICTORY	HRW	DILLWYN	KS	67557	64
VICTORY	HRW	HARDTNER	KS	67057	64
VICTORY	HRW	HIAWATHA	KS	66434	64
VICTORY	HRW	OTIS	CO	80743	65
VICTORY	HRW	WHITE-CLOUD	KS	66094	65
VICTORY	HRW	WHITE-CLOUD	KS	66094	65
VICTORY	HRW	HOLTON	KS	66436	65
VICTORY	HRW	LIMON	CO	80828	65
VICTORY	HRW	HOLTON	KS	66436	66
VICTORY	HRW	LONGFORD	KS	67458	66
VICTORY	HRW	LONGFORD	KS	67458	66
VICTORY	HRW	HOLTON	KS	66436	66
VICTORY	HRW	HIAWATHA	KS	66434	66
VICTORY	HRW	CUNNINGHAM	KS	67035	67
VICTORY	HRW	LINCOLN	KS	67455	67
VICTORY	HRW	OTIS	CO	80743	68
VICTORY	HRW	MANHATTAN	KS	66502	68
VICTORY	HRW	MINNEAPOLIS	KS	67467	68
VICTORY	HRW	ASHERVILLE	KS	67420	69
VICTORY	HRW	ST-JOHN	KS	67576	69
VICTORY	HRW	WHITE-CLOUD	KS	66094	70
VICTORY	HRW	COLDWATER	KS	67029	71
VICTORY	HRW	JETMORE	KS	67854	73
VICTORY	HRW	RYUS	KS	67870	74

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
VICTORY	HRW	PHILLIPSBURG	KS	67661	74
VICTORY	HRW	PARK	KS	67751	74
VICTORY	HRW	ASHERVILLE	KS	67420	75
VICTORY	HRW	SUBLETTE	KS	67877	77
VICTORY	HRW	HUGOTON	KS	67951	78
VICTORY	HRW	HUGOTON	KS	67951	79
VICTORY	HRW	PHILLIPSBURG	KS	67661	83
VONA	HRW	CHICKASHA	OK	73015	46
VONA	HRW	CHICKASHA	OK	73015	50
VONA	HRW	CHAPPELL	NE	69129	53
VONA	HRW	PEETZ	CO	80747	54
VONA	HRW	CHICKASHA	OK	73015	55
VONA	HRW	CHICKASHA	OK	73015	57
VONA	HRW	KANDRADO	KS	67741	59
VONA	HRW	PEETZ	CO	80747	60
VONA	HRW	CHICKASHA	OK	73015	60
VONA	HRW	ALLIANCE	NE	69301	62
VONA	HRW	ALLIANCE	NE	69301	63
VONA	HRW	PEETZ	CO	80747	63
VONA	HRW	GORDON	NE	69343	65
VONA	HRW	LIMON	CO	80828	65
VONA	HRW	COLDWATER	KS	67029	66
VONA	HRW	OTIS	CO	80743	68
VONA	HRW	PEETZ	CO	80747	69
VONA	HRW	HEMINGFORD	NE	69348	69
VONA	HRW	PEETZ	CO	80747	70
VONA	HRW	STANTON-CO	KS	67855	72
WALDRON	HRS	WYNDMERE	ND	58081	95
WEATHERMASTER-140A	HRW	SEWARD	KS	67577	68
WHEATON	HRS	ARGYLE	MN	56713	69
WHEATON	HRS	CYRUS	MN	56323	75
WHEATON	HRS	ARGYLE	MN	56713	76
WHEATON	HRS	BEULAH	ND	58523	76
WHEATON	HRS	ARGYLE	MN	56713	82
WHEATON	HRS	ARGYLE	MN	56713	87
WHEATON	HRS	ARGYLE	MN	56713	90
WINGS	HRW	IDALIA	CO	80735	45
WINGS	HRW	IDALIA	CO	80735	50
WINGS	HRW	ANTHONY	KS	67003	59
WRANGLER	HRW	AFTON	OK	74331	63
WRANGLER	HRW	CUNNINGHAM	KS	67035	65
WRANGLER	HRW	AFTON	OK	74331	66
WRANGLER	HRW	ANTHONY	KS	67003	66
YECORA-ROJO	HRW	GOSHEN	CA	93227	71
YECORA-ROJO	HRW	GOSHEN	CA	93227	71
YECORA-ROJO	HRW	GOSHEN	CA	93227	71
YECORA-ROJO	HRW	GOSHEN	CA	93227	71
YECORA-ROJO	HRW	GOSHEN	CA	93227	72
YECORA-ROJO	HRW	GOSHEN	CA	93227	72
YECORA-ROJO	HRW	GOSHEN	CA	93227	72

TABLE 3. NIR HARDNESS OF COMMERCIAL SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
ECORA-ROJO	HRW	GOSHEN	CA	93227	72
ECORA-ROJO	HRW	GOSHEN	CA	93227	72
ECORA-ROJO	HRW	GOSHEN	CA	93227	73
ECORA-ROJO	HRW	GOSHEN	CA	93227	73
ECORA-ROJO	HRW	GOSHEN	CA	93227	73
ECORA-ROJO	HRW	GOSHEN	CA	93227	74
ECORA-ROJO	HRW	GOSHEN	CA	93227	74
ECORA-ROJO	HRW	GOSHEN	CA	93227	75
ECORA-ROJO	HRW	GOSHEN	CA	93227	76
ECORA-ROJO	HRW	GOSHEN	CA	93227	76
ECORA-ROJO	HRW	GOSHEN	CA	93227	77
ECORA-ROJO	HRW	GOSHEN	CA	93227	77

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
ABILENE	HRW	WILSEY	KS	66873	62
ABILENE	HRW	MENTOR	KS	67401	64
ABILENE	HRW	NORDIN	OK	74631	64
ABILENE	HRW	PARTRIDGE	KS	67566	66
ABILENE	HRW	PALMER	KS	66962	69
ABILENE	HRW	MORAN	KS	66755	69
ABILENE	HRW	EVEREST	KS	66424	70
ABILENE	HRW	EVEREST	KS	66424	71
ABILENE	HRW	KINGMAN	KS	67068	73
ABILENE	HRW	GREELEY	KS	66033	77
ABILENE-DRYLAND	HRW	RENO-CO	KS	67501	47
ABILENE-DRYLAND	HRW	HARVEY-CO	KS	67114	53
ABILENE-DRYLAND	HRW	GREELEY-CO	KS	67879	59
ABILENE-DRYLAND	HRW	STAFFORD-CO	KS	67576	61
ABILENE-DRYLAND	HRW	FRANKLIN-CO	KS	66067	62
ABILENE-DRYLAND	HRW	BROWN-CO	KS	66434	63
ABILENE-DRYLAND	HRW	THOMAS-CO	KS	66701	63
ABILENE-DRYLAND	HRW	REPUBLIC-CO	KS	66935	66
ABILENE-DRYLAND	HRW	ELLIS-CO	KS	67601	67
ABILENE-DRYLAND	HRW	LABETTE	KS	67350	68
ABILENE-DRYLAND	HRW	FINNEY-CO	KS	67846	71
ABILENE-DRYLAND	HRW	GREELEY-CO	KS	67879	72
ABILENE-IRRIGATED	HRW	FINNEY-CO	KS	67846	60
ABILENE-IRRIGATED	HRW	STAFFORD-CO	KS	67576	60
ARKAN	HRW	MORAN	KS	66755	45
ARKAN	HRW	SABETHA	KS	66534	55
ARKAN	HRW	CANEY	KS	67333	56
ARKAN	HRW	HILLSBORO	KS	67063	58
ARKAN	HRW	NORDIN	OK	74631	58
ARKAN	HRW	PALMER	KS	66962	58
ARKAN	HRW	ARKANSAS-CITY	KS	67005	60
ARKAN	HRW	MILFORD	KS	66514	61
ARKAN	HRW	ALTA-VISTA	KS	66834	61
ARKAN	HRW	DELIA	KS	66418	62
ARKAN	HRW	HAVILAND	KS	67059	63
ARKAN	HRW	BONNER-SPRINGS	KS	66012	63
ARKAN	HRW	BONNER-SPRINGS	KS	66012	64
ARKAN	HRW	HAVEN	KS	67543	65
ARKAN	HRW	MANHATTAN	KS	66502	65
ARKAN	HRW	SYLVAN-GROVE	KS	67481	65
ARKAN	HRW	SYLVAN-GROVE	KS	67481	65
ARKAN	HRW	MILTONVALE	KS	67466	66
ARKAN	HRW	BELOIT	KS	67420	66
ARKAN	HRW	ARKANSAS-CITY	KS	67005	67
ARKAN	HRW	PALMER	KS	66962	70
ARKAN-DRYLAND	HRW	RENO-CO	KS	67501	45
ARKAN-DRYLAND	HRW	BROWN-CO	KS	66434	50
ARKAN-DRYLAND	HRW	STAFFORD-CO	KS	67576	52
ARKAN-DRYLAND	HRW	HARVEY-CO	KS	67114	57
ARKAN-DRYLAND	HRW	FRANKLIN-CO	KS	66067	58
ARKAN-DRYLAND	HRW	REPUBLIC-CO	KS	66935	58

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
ARKAN-DRYLAND	HRW	RILEY-CO	KS	66502	58
ARKAN-DRYLAND	HRW	THOMAS-CO	KS	66701	59
ARKAN-DRYLAND	HRW	FINNEY-CO	KS	67846	61
ARKAN-DRYLAND	HRW	GREELEY-CO	KS	67879	61
ARKAN-DRYLAND	HRW	ELLIS-CO	KS	67601	65
ARKAN-DRYLAND	HRW	LABETTE	KS	67350	66
ARKAN-IRRIGATED	HRW	STAFFORD-CO	KS	67576	55
ARKAN-IRRIGATED	HRW	GREELEY-CO	KS	67879	59
ARKAN-IRRIGATED	HRW	THOMAS-CO	KS	66701	60
ARKAN-IRRIGATED	HRW	FINNEY-CO	KS	67846	64
BECKER-DRYLAND	SRW	FRANKLIN-CO	KS	66067	17
BECKER-DRYLAND	SRW	LABETTE	KS	67350	26
BH-122	HRW	NORDIN	OK	74631	51
BH-122-DRYLAND	HRW	RENO-CO	KS	67501	37
BH-122-DRYLAND	HRW	HARVEY-CO	KS	67114	47
BH-122-DRYLAND	HRW	STAFFORD-CO	KS	67576	51
BH-122-DRYLAND	HRW	LABETTE	KS	67350	55
BH-122-DRYLAND	HRW	BROWN-CO	KS	66434	55
BH-122-DRYLAND	HRW	FRANKLIN-CO	KS	66067	59
BH-122-DRYLAND	HRW	FINNEY-CO	KS	67846	60
BH-122-DRYLAND	HRW	REPUBLIC-CO	KS	66935	61
BH-122-IRRIGATED	HRW	STAFFORD-CO	KS	67576	47
BH-122-IRRIGATED	HRW	FINNEY-CO	KS	67846	55
BH-122-IRRIGATED	HRW	THOMAS-CO	KS	66701	58
BH-203A-DRYLAND	HRW	RENO-CO	KS	67501	36
BH-203A-DRYLAND	HRW	BROWN-CO	KS	66434	38
BH-203A-DRYLAND	HRW	STAFFORD-CO	KS	67576	42
BH-203A-DRYLAND	HRW	FINNEY-CO	KS	67846	44
BH-203A-DRYLAND	HRW	HARVEY-CO	KS	67114	46
BH-203A-DRYLAND	HRW	REPUBLIC-CO	KS	66935	48
BH-203A-DRYLAND	HRW	LABETTE	KS	67350	53
BH-203A-IRRIGATED	HRW	STAFFORD-CO	KS	67576	42
BH-203A-IRRIGATED	HRW	THOMAS-CO	KS	66701	46
BH-203A-IRRIGATED	HRW	FINNEY-CO	KS	67846	47
BH-206-DRYLAND	HRW	RENO-CO	KS	67501	47
BH-206-IRRIGATED	HRW	STAFFORD-CO	KS	67576	62
BH-301	HRW	NORDIN	OK	74631	63
BRONCO-DRYLAND	HRW	STAFFORD-CO	KS	67576	55
BRONCO-DRYLAND	HRW	FINNEY-CO	KS	67846	62
BRONCO-DRYLAND	HRW	GREELEY-CO	KS	67879	63
BUTTE	HRS	BERESFORD	SD	57004	72
BUTTE-86	HRS	HIGHMORE	SD	57345	79
BUTTE-86	HRS	SELBY	SD	57472	83
BUTTE-86	HRS	BROOKINGS	SD	57006	86
CALDWELL	SRW	MORAN	KS	66755	19
CALDWELL-DRYLAND	SRW	RILEY-CO	KS	66502	19
CALDWELL-DRYLAND	SRW	FRANKLIN-CO	KS	66067	21
CALDWELL-DRYLAND	SRW	BROWN-CO	KS	66434	25
CALDWELL-IRRIGATED	SRW	STAFFORD-CO	KS	67576	25
CARSON	HRW	NORDIN	OK	74631	68
CARSON-DRYLAND	HRW	STAFFORD-CO	KS	67576	60

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
CARSON-DRYLAND	HRW	GREELEY-CO	KS	67879	67
CARSON-DRYLAND	HRW	THOMAS-CO	KS	66701	67
CENTURA-DRYLAND	HRW	RENO-CO	KS	67501	50
CENTURA-DRYLAND	HRW	BROWN-CO	KS	66434	62
CENTURA-DRYLAND	HRW	STAFFORD-CO	KS	67576	65
CENTURA-DRYLAND	HRW	REPUBLIC-CO	KS	66935	69
CENTURA-DRYLAND	HRW	FRANKLIN-CO	KS	66067	72
CENTURA-DRYLAND	HRW	RILEY-CO	KS	66502	73
CENTURA-DRYLAND	HRW	THOMAS-CO	KS	66701	75
CENTURY	HRW	CORVALLIS	OR	97330	52
CENTURY	HRW	OLNEY	TX	76374	54
CENTURY	HRW	CHILICOTHE	TX	76384	56
CENTURY	HRW	MORO	OR	97039	58
CENTURY	HRW	MUNDAY	TX	76301	63
CENTURY-87	HRW	STILLWELL	OK	74960	41
CENTURY-87	HRW	LAHOMA	OK	73754	49
CENTURY-87	HRW	GOODWELL	OK	73939	56
CENTURY-87-IRRIGATED	HRW	GOODWELL	OK	73939	59
CENTURY-88	HRW	ALTUS	OK	73521	36
CENTURY-88	HRW	LAHOMA	OK	73754	56
CENTURY-88	HRW	ALTUS	OK	73521	57
CENTURY-88	HRW	GOODWELL	OK	73939	57
CENTURY-88	HRW	WOODWARD	OK	73801	61
CENTURY-88	HRW	STILLWELL	OK	74960	66
CENTURY-88-IRRIGATED	HRW	GOODWELL	OK	73939	54
CENTURY-DRYLAND	HRW	RENO-CO	KS	67501	50
CENTURY-DRYLAND	HRW	HARVEY-CO	KS	67114	50
CENTURY-DRYLAND	HRW	FRANKLIN-CO	KS	66067	57
CENTURY-DRYLAND	HRW	RILEY-CO	KS	66502	60
CENTURY-DRYLAND	HRW	STAFFORD-CO	KS	67576	60
CENTURY-DRYLAND	HRW	BROWN-CO	KS	66434	61
CENTURY-DRYLAND	HRW	LABETTE	KS	67350	67
CENTURY-DRYLAND	HRW	FINNEY-CO	KS	67846	71
CENTURY-DRYLAND	HRW	GREELEY-CO	KS	67879	73
CENTURY-IRRIGATED	HRW	STAFFORD-CO	KS	67576	55
CENTURY-IRRIGATED	HRW	THOMAS-CO	KS	66701	61
CENTURY-IRRIGATED	HRW	FINNEY-CO	KS	67846	62
CHEYENNE	HRW	MORO	OR	97039	62
CHEYENNE	HRW	CORVALLIS	OR	97330	64
CHISHOLM	HRW	TOLBERT	TX	76384	30
CHISHOLM	HRW	OLNEY	TX	76374	32
CHISHOLM	HRW	MUNDAY	TX	76301	33
CHISHOLM	HRW	NORDIN	OK	74631	46
CHISHOLM-87	HRW	LAHOMA	OK	73754	23
CHISHOLM-87	HRW	STILLWELL	OK	74960	28
CHISHOLM-87	HRW	WOODWARD	OK	73801	29
CHISHOLM-87	HRW	GOODWELL	OK	73939	39
CHISHOLM-88	HRW	ALTUS	OK	73521	23
CHISHOLM-88	HRW	ALTUS	OK	73521	35
CHISHOLM-88	HRW	GOODWELL	OK	73939	37
CHISHOLM-88	HRW	STILLWELL	OK	74960	42

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
CHISHOLM-88	HRW	WOODWARD	OK	73801	43
CHISHOLM-88	HRW	LAHOMA	OK	73754	45
CHISHOLM-88-IRRIGATED	HRW	GOODWELL	OK	73939	38
CHISHOLM-DRYLAND	HRW	RENO-CO	KS	67501	27
CHISHOLM-DRYLAND	HRW	STAFFORD-CO	KS	67576	37
CHISHOLM-DRYLAND	HRW	RILEY-CO	KS	66502	38
CHISHOLM-DRYLAND	HRW	REPUBLIC-CO	KS	66935	38
CHISHOLM-DRYLAND	HRW	HARVEY-CO	KS	67114	38
CHISHOLM-DRYLAND	HRW	ELLIS-CO	KS	67601	42
CHISHOLM-DRYLAND	HRW	BROWN-CO	KS	66434	42
CHISHOLM-DRYLAND	HRW	FRANKLIN-CO	KS	66067	44
CHISHOLM-DRYLAND	HRW	FINNEY-CO	KS	67846	46
CHISHOLM-DRYLAND	HRW	GREELEY-CO	KS	67879	46
CHISHOLM-DRYLAND	HRW	STAFFORD-CO	KS	67576	37
CHISHOLM-IRRIGATED	HRW	THOMAS-CO	KS	66701	54
CO820026-EXP-DRYLAND	HRW	THOMAS-CO	KS	66701	60
CO820026-EXP-IRRIGATED	HRW	STAFFORD-CO	KS	67576	54
CO820026-EXP-IRRIGATED	HRW	THOMAS-CO	KS	66701	62
CODY-DRYLAND	HRW	REPUBLIC-CO	KS	66935	71
CODY-DRYLAND	HRW	THOMAS-CO	KS	66701	71
CODY-DRYLAND	HRW	GREELEY-CO	KS	67879	72
CODY-DRYLAND	HRW	ELLIS-CO	KS	67601	77
CODY-IRRIGATED	HRW	GREELEY-CO	KS	67879	65
CODY-IRRIGATED	HRW	THOMAS-CO	KS	66701	67
COLLIN	HRW	OLNEY	TX	76374	22
COLLIN	HRW	TOLBERT	TX	76384	25
COLLIN	HRW	MUNDAY	TX	76301	26
COLLIN	HRW	CHILICOTHE	TX	76384	29
COLT	HRW	CORVALLIS	OR	97330	43
COLT	HRW	MORO	OR	97039	52
COLT-DRYLAND	HRW	RILEY-CO	KS	66502	50
COLT-DRYLAND	HRW	BROWN-CO	KS	66434	51
COLT-DRYLAND	HRW	REPUBLIC-CO	KS	66935	56
COLT-DRYLAND	HRW	THOMAS-CO	KS	66701	60
COLT-DRYLAND	HRW	GREELEY-CO	KS	67879	64
COLT-DRYLAND	HRW	GREELEY-CO	KS	67879	62
COLT-IRRIGATED	HRW	RILEY-CO	KS	66502	15
COMPTON-DRYLAND	SRW	BROWN-CO	KS	66434	20
COMPTON-DRYLAND	SRW	FRANKLIN-CO	KS	66067	22
COMPTON-DRYLAND	SRW	LABETTE	KS	67350	26
COMPTON-DRYLAND	SRW	STAFFORD-CO	KS	67576	18
COMPTON-IRRIGATED	HRW	FRESHO	SD	57568	49
DAWN	HRW	FRESHO	SD	57568	55
DAWN	HRW	ONIDA	SD	57564	59
DAWN	HRW	BROOKINGS	SD	57006	59
DAWN	HRW	LABETTE	KS	67350	62
DELANGE-7834-DRYLAND	HRW	RENO-CO	KS	67501	46
DELANGE-7837-DRYLAND	HRW	STAFFORD-CO	KS	67576	50
DELANGE-7837-DRYLAND	HRW	BROWN-CO	KS	66434	52
DELANGE-7837-DRYLAND	HRW	HARVEY-CO	KS	67114	53
DELANGE-7837-DRYLAND	HRW	FRANKLIN-CO	KS	66067	56

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
DELANGE-7837-DRYLAND	HRW	THOMAS-CO	KS	66701	59
DELANGE-7837-DRYLAND	HRW	ELLIS-CO	KS	67601	61
DELANGE-7837-DRYLAND	HRW	FINNEY-CO	KS	67846	72
DELANGE-7846-DRYLAND	HRW	RENO-CO	KS	67501	39
DELANGE-7846-DRYLAND	HRW	BROWN-CO	KS	66434	50
DELANGE-7846-DRYLAND	HRW	FRANKLIN-CO	KS	66067	52
DELANGE-7846-DRYLAND	HRW	STAFFORD-CO	KS	67576	54
DELANGE-7846-DRYLAND	HRW	RILEY-CO	KS	66502	57
DELANGE-7846-DRYLAND	HRW	THOMAS-CO	KS	66701	60
DELANGE-7846-DRYLAND	HRW	FINNEY-CO	KS	67846	61
DELANGE-7846-DRYLAND	HRW	LABETTE	KS	67350	68
DODGE	HRW	CORVALLIS	OR	97330	48
DODGE	HRW	MORO	OR	97039	57
DODGE	HRW	RANSOM	KS	67572	67
DODGE	HRW	BONNER-SPRINGS	KS	66012	68
DODGE	HRW	TIMKEN	KS	67582	69
DODGE	HRW	LARNED	KS	67550	72
DODGE	HRW	MANTER	KS	67862	73
DODGE-DRYLAND	HRW	BROWN-CO	KS	66434	54
DODGE-DRYLAND	HRW	FRANKLIN-CO	KS	66067	56
DODGE-DRYLAND	HRW	STAFFORD-CO	KS	67576	59
DODGE-DRYLAND	HRW	THOMAS-CO	KS	66701	62
DODGE-DRYLAND	HRW	GREELEY-CO	KS	67879	65
DODGE-DRYLAND	HRW	REPUBLIC-CO	KS	66935	68
DODGE-DRYLAND	HRW	FINNEY-CO	KS	67846	69
DODGE-DRYLAND	HRW	GREELEY-CO	KS	67879	70
DODGE-DRYLAND	HRW	ELLIS-CO	KS	67601	78
DODGE-IRRIGATED	HRW	STAFFORD-CO	KS	67576	56
DODGE-IRRIGATED	HRW	FINNEY-CO	KS	67846	66
DUSTY	SWW	MORO	OR	97039	11
DUSTY	SWW	WASCO-CO	OR	97063	16
DUSTY	SWW	PENDLETON	OR	97801	19
DUSTY	SWW	CORVALLIS	OR	97330	21
EAGLE	HRW	MANTER	KS	67862	76
GUARD	HRS	BERESFORD	SD	57004	63
GUARD	HRS	HIGHMORE	SD	57345	65
GUARD	HRS	SELBY	SD	57472	68
GUARD	HRS	BROOKINGS	SD	57006	76
HAWK	HRW	CHILICOTHE	TX	76384	60
HAWK	HRW	MUNDAY	TX	76301	70
HAWK	HRW	TOLBERT	TX	76384	73
HILL-81	SWW	WASCO-CO	OR	97063	20
HILL-81	SWW	HERMISTON	OR	97838	22
HILL-81	SWW	CORVALLIS	OR	97330	24
HILL-81	SWW	MORO	OR	97039	27
HILL-81	SWW	PENDLETON	OR	97801	28
KARL	HRW	TOLBERT	TX	76384	53
KARL	HRW	OLNEY	TX	76374	54
KARL	HRW	NORDIN	OK	74631	58
KARL	HRW	MUNDAY	TX	76301	62
KARL	HRW	CHILICOTHE	TX	76384	69

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
KARL-DRYLAND	HRW	RENO-CO	KS	67501	45
KARL-DRYLAND	HRW	RILEY-CO	KS	66502	55
KARL-DRYLAND	HRW	BROWN-CO	KS	66434	56
KARL-DRYLAND	HRW	REPUBLIC-CO	KS	66935	62
KARL-DRYLAND	HRW	STAFFORD-CO	KS	67576	62
KARL-DRYLAND	HRW	LABETTE	KS	67350	68
KARL-DRYLAND	HRW	GREELEY-CO	KS	67879	69
KARL-DRYLAND	HRW	THOMAS-CO	KS	66701	70
KARL-DRYLAND	HRW	FINNEY-CO	KS	67846	73
KARL-IRRIGATED	HRW	STAFFORD-CO	KS	67576	55
KARL-IRRIGATED	HRW	FINNEY-CO	KS	67846	63
KARL-IRRIGATED	HRW	THOMAS-CO	KS	66701	63
KARL-IRRIGATED	HRW	GREELEY-CO	KS	67879	67
KS-4578	HRW	CORVALLIS	OR	97330	68
KS-831862	HWW	CORVALLIS	OR	97330	65
KS-831862	HWW	MORO	OR	97039	70
KS84HW196-EXP-DRYLAND	HWW	RENO-CO	KS	67501	44
KS84HW196-EXP-DRYLAND	HWW	STAFFORD-CO	KS	67576	56
KS84HW196-EXP-DRYLAND	HWW	FINNEY-CO	KS	67846	62
KS84HW196-EXP-DRYLAND	HWW	ELLIS-CO	KS	67601	63
KS84HW196-EXP-DRYLAND	HWW	FINNEY-CO	KS	67846	68
KS84HW196-EXP-IRRIGATED	HWW	FINNEY-CO	KS	67846	68
KS84W196-EXP-DRYLAND	HWW	THOMAS-CO	KS	66701	70
KS84WH196-EXP-IRRIGATED	HWW	THOMAS-CO	KS	66701	67
LARNED	HRW	PENOKEE	KS	67642	63
LARNED	HRW	PENOKEE	KS	67642	66
LARNED	HRW	RANSOM	KS	67572	67
LARNED	HRW	CIMMERON	KS	67835	69
LARNED	HRW	MENLO	KS	67746	71
LARNED	HRW	WAKENEZY	KS	67672	71
LARNED	HRW	LARNED	KS	67550	76
LARNED-DRYLAND	HRW	RENO-CO	KS	67501	45
LARNED-DRYLAND	HRW	HARVEY-CO	KS	67114	57
LARNED-DRYLAND	HRW	BROWN-CO	KS	66434	61
LARNED-DRYLAND	HRW	STAFFORD-CO	KS	67576	63
LARNED-DRYLAND	HRW	RILEY-CO	KS	66502	64
LARNED-DRYLAND	HRW	THOMAS-CO	KS	66701	65
LARNED-DRYLAND	HRW	FINNEY-CO	KS	67846	67
LARNED-DRYLAND	HRW	GREELEY-CO	KS	67879	67
LARNED-DRYLAND	HRW	FRANKLIN-CO	KS	66067	68
LARNED-DRYLAND	HRW	LABETTE	KS	67350	73
LARNED-DRYLAND	HRS	BERESFORD	SD	57004	71
LEN	HRS	CROOKSTON	MN	56716	72
LEN	HRS	ST-PAUL	MN	55101	81
LEN	HRS	MORRIS	MN	56267	81
LEN	HRS	HIGHMORE	SD	57345	82
LEN	HRS	BROOKINGS	SD	57006	87
MALCOLM	SWW	WASCO-CO	OR	97063	20
MALCOLM	SWW	CORVALLIS	OR	97330	27
MALCOLM	SWW	MORO	OR	97039	31
MARSHALL	HRS	BERESFORD	SD	57004	65
MARSHALL	HRS	CROOKSTON	MN	56716	66

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
MARSHALL	HRS	MORRIS	MN	56267	69
MARSHALL	HRS	SELBY	SD	57472	71
MARSHALL	HRS	HIGHMORE	SD	57345	74
MARSHALL	HRS	ST-PAUL	MN	55101	76
MARSHALL	HRS	BROOKINGS	SD	57006	77
MESA	HRW	OLNEY	TX	76374	58
MESA	HRW	MORAN	KS	66755	59
MESA	HRW	BELLE-PLAINE	KS	67013	59
MESA	HRW	MUNDAY	TX	76301	62
MESA	HRW	BELLE-PLAINE	KS	67013	62
MESA	HRW	GIRARD	KS	66743	64
MESA	HRW	TOLBERT	TX	76384	64
MESA	HRW	WINFIELD	KS	67156	64
MESA	HRW	WINFIELD	KS	67156	66
MESA	HRW	ULYSSES	KS	67880	68
MESA	HRW	CHASE	KS	67524	69
MESA	HRW	PARTRIDGE	KS	67566	72
MESA	HRW	CHILICOTHE	TX	76384	72
MESA	HRW	MANHATTAN	KS	66502	73
MESA	HRW	GARDEN-CITY	KS	67846	75
MESA	HRW	GARDEN-CITY	KS	67846	75
MESA	HRW	PALMER	KS	66962	76
MESA	HRW	BISON	KS	67520	76
MESA-DRYLAND	HRW	RENO-CO	KS	67501	53
MESA-DRYLAND	HRW	BROWN-CO	KS	66434	58
MESA-DRYLAND	HRW	HARVEY-CO	KS	67114	59
MESA-DRYLAND	HRW	THOMAS-CO	KS	66701	60
MESA-DRYLAND	HRW	FRANKLIN-CO	KS	66067	60
MESA-DRYLAND	HRW	RILEY-CO	KS	66502	62
MESA-DRYLAND	HRW	REPUBLIC-CO	KS	66935	64
MESA-DRYLAND	HRW	STAFFORD-CO	KS	67576	68
MESA-DRYLAND	HRW	GREELEY-CO	KS	67879	71
MESA-DRYLAND	HRW	LABETTE	KS	67350	72
MESA-DRYLAND	HRW	ELLIS-CO	KS	67601	75
MESA-IRRIGATED	HRW	THOMAS-CO	KS	66701	60
MESA-IRRIGATED	HRW	GREELEY-CO	KS	67879	63
MESA-IRRIGATED	HRW	STAFFORD-CO	KS	67576	64
MESA-EXP-DRYLAND	SRW	RILEY-CO	KS	66502	8
MESA-EXP-DRYLAND	SRW	LABETTE	KS	67350	14
MESA-EXP-DRYLAND	SRW	FRANKLIN-CO	KS	66067	15
MESA-EXP-DRYLAND	SRW	BROWN-CO	KS	66434	15
MESA-EXP-DRYLAND	HRW	TOLBERT	TX	76384	52
MESA-EXP-DRYLAND	HRW	CHILICOTHE	TX	76384	59
MESA-EXP-DRYLAND	HRW	NORDIN	OK	74631	63
MESA-EXP-DRYLAND	HRW	MUNDAY	TX	76301	63
MUSTANG-87	HRW	WOODWARD	OK	73801	46
MUSTANG-87	HRW	LAHOMA	OK	73754	46
MUSTANG-87	HRW	GOODWELL	OK	73939	64
MUSTANG-87-IRRIGATED	HRW	GOODWELL	OK	73939	51
MUSTANG-88	HRW	ALTUS	OK	73521	39
MUSTANG-DRYLAND	HRW	RENO-CO	KS	67501	44

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
MUSTANG-DRYLAND	HRW	HARVEY-CO	KS	67114	53
MUSTANG-DRYLAND	HRW	BROWN-CO	KS	66434	55
MUSTANG-DRYLAND	HRW	REPUBLIC-CO	KS	66935	59
MUSTANG-DRYLAND	HRW	RILEY-CO	KS	66502	60
MUSTANG-DRYLAND	HRW	FINNEY-CO	KS	67846	62
MUSTANG-DRYLAND	HRW	THOMAS-CO	KS	66701	63
MUSTANG-DRYLAND	HRW	LABETTE	KS	67350	66
MUSTANG-DRYLAND	HRW	ELLIS-CO	KS	67601	69
MUSTANG-DRYLAND	HRW	GREELEY-CO	KS	67879	71
MUSTANG-IRRIGATED	HRW	GREELEY-CO	KS	67879	61
MUSTANG-IRRIGATED	HRW	FINNEY-CO	KS	67846	62
NEWTON	HRW	MANHATTAN	KS	66502	53
NEWTON	HRW	BONNER-SPRINGS	KS	66012	58
NEWTON	HRW	TIMKEN	KS	67582	59
NEWTON	HRW	BONNER-SPRINGS	KS	66012	60
NEWTON	HRW	OSBORN	KS	67473	61
NEWTON	HRW	LANGDON	KS	67549	61
NEWTON	HRW	MANTER	KS	67862	70
NEWTON	HRW	CIMMERON	KS	67835	70
NEWTON-DRYLAND	HRW	RENO-CO	KS	67501	41
NEWTON-DRYLAND	HRW	HARVEY-CO	KS	67114	53
NEWTON-DRYLAND	HRW	FRANKLIN-CO	KS	66067	53
NEWTON-DRYLAND	HRW	BROWN-CO	KS	66434	53
NEWTON-DRYLAND	HRW	RILEY-CO	KS	66502	56
NEWTON-DRYLAND	HRW	REPUBLIC-CO	KS	66935	57
NEWTON-DRYLAND	HRW	STAFFORD-CO	KS	67576	58
NEWTON-DRYLAND	HRW	THOMAS-CO	KS	66701	58
NEWTON-DRYLAND	HRW	FINNEY-CO	KS	67846	63
NEWTON-DRYLAND	HRW	GREELEY-CO	KS	67879	63
NEWTON-DRYLAND	HRW	ELLIS-CO	KS	67601	63
NEWTON-DRYLAND	HRW	LABETTE	KS	67350	66
NEWTON-IRRIGATED	HRW	STAFFORD-CO	KS	67576	49
NEWTON-IRRIGATED	HRW	GREELEY-CO	KS	67879	52
NEWTON-IRRIGATED	HRW	FINNEY-CO	KS	67846	54
NK-PRO-812	HRW	OLNEY	TX	76374	63
NK-PRO-812	HRW	MUNDAY	TX	76301	74
NK-PRO-812	HRW	CHILICOTHE	TX	76384	74
NORKAN	HRW	MANHATTAN	KS	66502	54
NORKAN	HRW	FRANKLIN-CO	KS	66067	56
NORKAN	HRW	CORVALLIS	OR	97330	60
NORKAN	HRW	SABETHA	KS	66534	63
NORKAN	HRW	ALTA-VISTA	KS	66834	64
NORKAN	HRW	BURLINGAME	KS	66413	64
NORKAN	HRW	BELOIT	KS	67420	65
NORKAN	HRW	NORDIN	OK	74631	65
NORKAN	HRW	HOPE	KS	67451	66
NORKAN	HRW	MORO	OR	97039	67
NORKAN	HRW	JEWELL	KS	66949	71
NORKAN	HRW	MILTONVALE	KS	67466	73
NORKAN	HRW	RENO-CO	KS	67501	41
NORKAN-DRYLAND	HRW	BROWN-CO	KS	66434	56
NORKAN-DRYLAND	HRW				

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
NORKAN-DRYLAND	HRW	RILEY-CO	KS	66502	59
NORKAN-DRYLAND	HRW	HARVEY-CO	KS	67114	59
NORKAN-DRYLAND	HRW	REPUBLIC-CO	KS	66935	60
NORKAN-DRYLAND	HRW	FINNEY-CO	KS	67846	64
NORKAN-DRYLAND	HRW	THOMAS-CO	KS	66701	65
NORKAN-DRYLAND	HRW	GREELEY-CO	KS	67879	66
NORKAN-DRYLAND	HRW	LABETTE	KS	67350	68
NORKAN-DRYLAND	HRW	ELLIS-CO	KS	67601	68
NORKAN-IRRIGATED	HRW	STAFFORD-CO	KS	67576	59
NORKAN-IRRIGATED	HRW	FINNEY-CO	KS	67846	61
NORKAN-IRRIGATED	HRW	GREELEY-CO	KS	67879	65
OR-CR8313	HRW	MORO	OR	97039	61
OR-CR8313	HRW	CORVALLIS	OR	97330	62
OR-CR8313	HRW	WASCO-CO	OR	97063	63
OR-CR8313	HRW	PENDLETON	OR	97801	68
OR8400464P	SWW	CORVALLIS	OR	97330	20
OR8400464P	SWW	MORO	OR	97039	28
OR8400882H	SWW	PENDLETON	OR	97801	24
OR8400882H	SWW	MORO	OR	97039	27
OR8400882H	SWW	CORVALLIS	OR	97330	27
OR8500305P	SWW	CORVALLIS	OR	97330	20
OR8500305P	SWW	PENDLETON	OR	97801	28
OR8500374H	HWW	PENDLETON	OR	97801	59
OR8500374H	HWW	MORO	OR	97039	64
OR8500378H	HWW	CORVALLIS	OR	97330	54
OR8500378H	HWW	MORO	OR	97039	62
OR8500378H	HWW	PENDLETON	OR	97801	63
OR8500974P	SWW	MORO	OR	97039	27
OR8500974P	SWW	PENDLETON	OR	97801	27
OR8500974P	SWW	CORVALLIS	OR	97330	33
OR8502288H	SWW	CORVALLIS	OR	97330	18
OR8502288H	SWW	MORO	OR	97039	25
OR8502288H	SWW	PENDLETON	OR	97801	25
OR8505311P	SWW	CORVALLIS	OR	97330	23
OR8505311P	SWW	MORO	OR	97039	42
OR8505311P	SWW	PENDLETON	OR	97801	48
OR8600049	HWW	CORVALLIS	OR	97330	64
OR8600049	HWW	MORO	OR	97039	66
OR8600049	HWW	PENDLETON	OR	97801	72
OR8600341	HWW	MORO	OR	97039	63
OR8600341	HWW	CORVALLIS	OR	97330	65
OR8600341	HWW	PENDLETON	OR	97801	68
OR8600471	HWW	MORO	OR	97039	48
OR8600471	HWW	CORVALLIS	OR	97330	54
OR8600701	HWW	CORVALLIS	OR	97330	66
OR8600701	HWW	PENDLETON	OR	97801	68
OR8600701	HWW	MORO	OR	97039	73
OR860292	SWW	CORVALLIS	OR	97330	21
OR860292	SWW	PENDLETON	OR	97801	26
OR860293	SWW	PENDLETON	OR	97801	22
OR860293	SWW	CORVALLIS	OR	97330	23

TABLE 4. NIK HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
OR860293	SWW	MORO	OR	97039	25
OR860296	SWW	PENDLETON	OR	97801	30
OR860296	SWW	CORVALLIS	OR	97330	32
OR860296	SWW	MORO	OR	97039	32
OR860297	HWW	MORO	OR	97039	25
OR860297	HWW	CORVALLIS	OR	97330	31
OR860301	SWW	PENDLETON	OR	97801	22
OR860301	SWW	MORO	OR	97039	22
OR860301	SWW	CORVALLIS	OR	97330	23
OR860302	SWW	PENDLETON	OR	97801	21
OR860302	SWW	CORVALLIS	OR	97330	24
OR860302	SWW	MORO	OR	97039	28
OR860303	SWW	CORVALLIS	OR	97330	20
OR860303	SWW	PENDLETON	OR	97801	21
OR860303	SWW	MORO	OR	97039	27
OR860436	SWW	MORO	OR	97039	20
OR860436	SWW	PENDLETON	OR	97801	23
OR860553	SWW	PENDLETON	OR	97801	25
OR860553	SWW	MORO	OR	97039	29
OR860553	SWW	CORVALLIS	OR	97330	31
OR860571	SWW	PENDLETON	OR	97801	18
OR860571	SWW	CORVALLIS	OR	97330	20
OR860571	SWW	MORO	OR	97039	28
OR860575	SWW	CORVALLIS	OR	97330	17
OR860575	SWW	PENDLETON	OR	97801	25
OR860576	SWW	CORVALLIS	OR	97330	30
OR860576	SWW	MORO	OR	97039	31
OR860576	SWW	CORVALLIS	OR	97330	32
OR860576	SWW	MORO	OR	97039	24
OR860754	SWW	PENDLETON	OR	97801	32
OR860754	SWW	CORVALLIS	OR	97330	34
OR860754	HWW	MORO	OR	97039	39
OR860756	HWW	CORVALLIS	OR	97330	50
OR860756	HWW	PENDLETON	OR	97801	53
OR860756	SWW	MORO	OR	97039	27
OR861219	SWW	PENDLETON	OR	97801	30
OR861219	SWW	PENDLETON	OR	97801	27
OR861226	SWW	MORO	OR	97039	28
OR861226	SWW	CORVALLIS	OR	97330	30
OR861226	SWW	MORO	OR	97039	27
OR861425	SWW	CORVALLIS	OR	97330	20
OR861425	SWW	PENDLETON	OR	97801	
OR861425	SWW	CORVALLIS	OR	97330	
OVESON	SWW	MORO	OR	97039	
OVESON	SWW	WASCO-CO	OR	97063	
OVESON	SWW	HERMISTON	OR	97838	
OVESON	SWW	PENDLETON	OR	97801	
OVESON	HRW	FRANKLIN-CO	KS	66067	
PIONEER-2154	HRW	NORDIN	OK	74631	
PIONEER-2154	HRW	GREELEY-CO	KS	67879	
PIONEER-2154-DRYLAND	HRW	BROWN-CO	KS	66434	
PIONEER-2154-DRYLAND					

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
PIONEER-2154-DRYLAND	HRW	HARVEY-CO	KS	67114	73
PIONEER-2154-DRYLAND	HRW	GREELEY-CO	KS	67879	74
PIONEER-2154-DRYLAND	HRW	STAFFORD-CO	KS	67576	75
PIONEER-2154-DRYLAND	HRW	REPUBLIC-CO	KS	66935	75
PIONEER-2154-DRYLAND	HRW	FINNEY-CO	KS	67846	77
PIONEER-2154-DRYLAND	HRW	RILEY-CO	KS	66502	80
PIONEER-2154-DRYLAND	HRW	ELLIS-CO	KS	67601	81
PIONEER-2154-DRYLAND	HRW	LABETTE	KS	67350	84
PIONEER-2154-IRRIGATED	HRW	THOMAS-CO	KS	66701	76
PIONEER-2154-IRRIGATED	HRW	STAFFORD-CO	KS	67576	77
PIONEER-2157	HRW	NORDIN	OK	74631	61
PIONEER-2157-88	HRW	GOODWELL	OK	73939	49
PIONEER-2157-88	HRW	WOODWARD	OK	73801	52
PIONEER-2157-88	HRW	LAHOMA	OK	73754	56
PIONEER-2157-88	HRW	STILLWELL	OK	74960	59
PIONEER-2157-88	HRW	ALTUS	OK	73521	60
PIONEER-2157-88-IRRIGATED	HRW	GOODWELL	OK	73939	54
PIONEER-2157-DRYLAND	HRW	RENO-CO	KS	67501	41
PIONEER-2157-DRYLAND	HRW	HARVEY-CO	KS	67114	50
PIONEER-2157-DRYLAND	HRW	RILEY-CO	KS	66502	50
PIONEER-2157-DRYLAND	HRW	STAFFORD-CO	KS	67576	52
PIONEER-2157-DRYLAND	HRW	GREELEY-CO	KS	67879	57
PIONEER-2157-DRYLAND	HRW	ELLIS-CO	KS	67601	59
PIONEER-2157-DRYLAND	HRW	REPUBLIC-CO	KS	66935	60
PIONEER-2157-DRYLAND	HRW	BROWN-CO	KS	66434	62
PIONEER-2157-DRYLAND	HRW	LABETTE	KS	67350	66
PIONEER-2157-IRRIGATED	HRW	STAFFORD-CO	KS	67576	53
PIONEER-2157-IRRIGATED	HRW	GREELEY-CO	KS	67879	53
PIONEER-2157-IRRIGATED	HRW	FINNEY-CO	KS	67846	58
PIONEER-2163	HRW	NORDIN	OK	74631	62
PIONEER-2172	HRW	NORDIN	OK	74631	74
PIONEER-2172-DRYLAND	HRW	RENO-CO	KS	67501	51
PIONEER-2172-DRYLAND	HRW	RILEY-CO	KS	66502	60
PIONEER-2172-DRYLAND	HRW	STAFFORD-CO	KS	67576	68
PIONEER-2172-DRYLAND	HRW	THOMAS-CO	KS	66701	71
PIONEER-2172-DRYLAND	HRW	BROWN-CO	KS	66434	72
PIONEER-2172-DRYLAND	HRW	HARVEY-CO	KS	67114	72
PIONEER-2172-DRYLAND	HRW	REPUBLIC-CO	KS	66935	73
PIONEER-2172-DRYLAND	HRW	FINNEY-CO	KS	67846	74
PIONEER-2172-DRYLAND	HRW	GREELEY-CO	KS	67879	76
PIONEER-2172-DRYLAND	HRW	ELLIS-CO	KS	67601	79
PIONEER-2172-DRYLAND	HRW	LABETTE	KS	67350	84
PIONEER-2172-IRRIGATED	HRW	GREELEY-CO	KS	67879	71
PIONEER-2172-IRRIGATED	HRW	FINNEY-CO	KS	67846	75
PIONEER-2172-IRRIGATED	HRW	THOMAS-CO	KS	66701	76
PIONEER-2306	HRS	MORRIS	MN	56267	78
PIONEER-2360	HRS	CROOKSTON	MN	56716	78
PIONEER-2360	HRS	ST-PAUL	MN	55101	84
PIONEER-2364	HRS	SELBY	SD	57472	79
PIONEER-2369	HRS	BERESFORD	SD	57004	72
PIONEER-2369	HRS	HIGHMORE	SD	57345	77

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
PIONEER-2551	SRW	MORO	OR	97039	22
PIONEER-2551	SRW	FRANKLIN-CO	KS	66067	23
PIONEER-2551	SRW	CORVALLIS	OR	97330	24
PIONEER-2551-DRYLAND	SRW	BROWN-CO	KS	66434	16
PIONEER-2551-DRYLAND	SRW	RILEY-CO	KS	66502	19
PIONEER-2551-DRYLAND	SRW	LABETTE	KS	67350	22
QUANTUM-378	HRW	NORDIN	OK	74631	57
QUANTUM-562-DRYLAND	HRW	THOMAS-CO	KS	66701	59
QUANTUM-562-DRYLAND	HRW	REPUBLIC-CO	KS	66935	61
QUANTUM-562-DRYLAND	HRW	ELLIS-CO	KS	67601	63
QUANTUM-564	HRW	NORDIN	OK	74631	54
QUANTUM-578-DRYLAND	HRW	FINNEY-CO	KS	67846	64
QUANTUM-578-DRYLAND	HRW	GREELEY-CO	KS	67879	77
QUANTUM-578-IRRIGATED	HRW	GREELEY-CO	KS	67879	55
QUANTUM-578-IRRIGATED	HRW	FINNEY-CO	KS	67846	57
QUANTUM-578-IRRIGATED	HRW	THOMAS-CO	KS	66701	63
REDLAND	HRW	PRESHO	SD	57568	50
REDLAND	HRW	ONIDA	SD	57564	51
REDLAND	HRW	HIGHMORE	SD	57345	52
REDLAND	HRW	BROOKINGS	SD	57006	59
REDLAND-DRYLAND	HRW	THOMAS-CO	KS	66701	57
REDLAND-DRYLAND	HRW	BROWN-CO	KS	66434	62
REDLAND-DRYLAND	HRW	GREELEY-CO	KS	67879	63
REDLAND-DRYLAND	HRW	FINNEY-CO	KS	67846	64
REDLAND-DRYLAND	HRW	REPUBLIC-CO	KS	66935	65
RH-7833	HRW	NORDIN	OK	74631	57
RH-7837	HRW	NORDIN	OK	74631	55
RH7837	HRW	HOPE	KS	67451	61
RH7846	HRW	HOPE	KS	67451	57
RH7846	HRW	PALMER	KS	66962	61
RIO-BLANCO	HWW	NORDIN	OK	74631	58
RIO-BLANCO-DRYLAND	HWW	RENO-CO	KS	67501	41
RIO-BLANCO-DRYLAND	HWW	HARVEY-CO	KS	67114	51
RIO-BLANCO-DRYLAND	HWW	RILEY-CO	KS	66502	56
RIO-BLANCO-DRYLAND	HWW	BROWN-CO	KS	66434	58
RIO-BLANCO-DRYLAND	HWW	FRANKLIN-CO	KS	66067	61
RIO-BLANCO-DRYLAND	HWW	STAFFORD-CO	KS	67576	61
RIO-BLANCO-DRYLAND	HWW	THOMAS-CO	KS	66701	61
RIO-BLANCO-DRYLAND	HWW	FINNEY-CO	KS	67846	62
RIO-BLANCO-DRYLAND	HWW	ELLIS-CO	KS	67601	63
RIO-BLANCO-DRYLAND	HWW	LABETTE	KS	67350	66
RIO-BLANCO-IRRIGATED	HWW	STAFFORD-CO	KS	67576	58
RIO-BLANCO-IRRIGATED	HWW	THOMAS-CO	KS	66701	58
RIO-BLANCO-IRRIGATED	HWW	GREELEY-CO	KS	67879	59
RIO-BLANCO-IRRIGATED	HWW	FINNEY-CO	KS	67846	59
ROSE	HRW	PRESHO	SD	57568	57
ROSE	HRW	ONIDA	SD	57564	59
ROSE	HRW	HIGHMORE	SD	57345	61
ROSE	HRW	BROOKINGS	SD	57006	66
ROUGH RIDER	HRW	PRESHO	SD	57568	58
ROUGH RIDER	HRW	HIGHMORE	SD	57345	62

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
ROUGH RIDER	HRW	ONIDA	SD	57564	63
ROUGH RIDER	HRW	BROOKINGS	SD	57006	67
SANDY-DRYLAND	HRW	STAFFORD-CO	KS	67576	68
SANDY-DRYLAND	HRW	GREELEY-CO	KS	67879	74
SCOUT-66	HRW	HIGHMORE	SD	57345	62
SCOUT-66	HRW	FRANKLIN-CO	KS	66067	63
SCOUT-66	HRW	OLNEY	TX	76374	63
SCOUT-66	HRW	BROOKINGS	SD	57006	64
SCOUT-66	HRW	CHILICOTHE	TX	76384	65
SCOUT-66	HRW	MUNDAY	TX	76301	66
SCOUT-66	HRW	ONIDA	SD	57564	67
SCOUT-66	HRW	TOLBERT	TX	76384	67
SCOUT-66	HRW	SUBLETTE	KS	67877	76
SCOUT-66-DRYLAND	HRW	BROWN-CO	KS	66434	60
SCOUT-66-DRYLAND	HRW	STAFFORD-CO	KS	67576	63
SCOUT-66-DRYLAND	HRW	RILEY-CO	KS	66502	64
SCOUT-66-DRYLAND	HRW	REPUBLIC-CO	KS	66935	64
SCOUT-66-DRYLAND	HRW	HARVEY-CO	KS	67114	66
SCOUT-66-DRYLAND	HRW	THOMAS-CO	KS	66701	68
SCOUT-66-DRYLAND	HRW	FINNEY-CO	KS	67846	69
SCOUT-66-DRYLAND	HRW	GREELEY-CO	KS	67879	71
SCOUT-66-DRYLAND	HRW	LABETTE	KS	67350	74
STIOUXLAND	HRW	ONIDA	SD	57564	54
STIOUXLAND	HRW	HIGHMORE	SD	57345	58
STIOUXLAND	HRW	OLNEY	TX	76374	59
STIOUXLAND	HRW	GREELEY	KS	66033	59
STIOUXLAND	HRW	BROOKINGS	SD	57006	59
STIOUXLAND	HRW	BURLINGAME	KS	66413	60
STIOUXLAND	HRW	FRANKLIN-CO	KS	66067	60
STIOUXLAND	HRW	CHILICOTHE	TX	76384	62
STIOUXLAND	HRW	TOLBERT	TX	76384	62
STIOUXLAND	HRW	MUNDAY	TX	76301	67
STIOUXLAND	HRW	LYONS	KS	67554	68
STIOUXLAND-87	HRW	STILLWELL	OK	74960	50
STIOUXLAND-87	HRW	WOODWARD	OK	73801	50
STIOUXLAND-87	HRW	LAHOMA	OK	73754	50
STIOUXLAND-87	HRW	GOODWELL	OK	73939	62
STIOUXLAND-87-IRRIGATED	HRW	GOODWELL	OK	73939	59
	HRW	WOODWARD	OK	73801	61
	HRW	GOODWELL	OK	73939	62
	HRW	STILLWELL	OK	74960	69
	HRW	ALTUS	OK	73521	72
ED	HRW	GOODWELL	OK	73939	60
	HRW	RENO-CO	KS	67501	39
	HRW	STAFFORD-CO	KS	67576	59
	HRW	BROWN-CO	KS	66434	61
	HRW	HARVEY-CO	KS	67114	61
	HRW	RILEY-CO	KS	66502	62
	HRW	ELLIS-CO	KS	67601	69
	HRW	LABETTE	KS	67350	70
	HRW	GREELEY-CO	KS	67879	71

TABLE 4. NIK HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
SIOUXLAND-DRYLAND	HRW	FINNEY-CO	KS	67846	73
SIOUXLAND-IRRIGATED	HRW	GREELEY-CO	KS	67879	60
SIOUXLAND-IRRIGATED	HRW	STAFFORD-CO	KS	67576	61
SIOUXLAND-IRRIGATED	HRW	FINNEY-CO	KS	67846	62
SIOUXLAND-IRRIGATED	HRW	THOMAS-CO	KS	66701	65
STALLION	HRW	NORDIN	OK	74631	64
STALLION-DRYLAND	HRW	RENO-CO	KS	67501	40
STALLION-DRYLAND	HRW	RENO-CO	KS	67501	48
STALLION-DRYLAND	HRW	HARVEY-CO	KS	67114	54
STALLION-DRYLAND	HRW	STAFFORD-CO	KS	67576	60
STALLION-IRRIGATED	HRW	STAFFORD-CO	KS	67576	60
STALLION-IRRIGATED	HRW	FINNEY-CO	KS	67846	61
STALLION-IRRIGATED	HRW	GREELEY-CO	KS	67879	63
STAR-SEED-830-DRYLAND	HRW	REPUBLIC-CO	KS	66935	64
STAR-SEED-830-DRYLAND	HRW	BROWN-CO	KS	66434	65
STAR-SEED-830-DRYLAND	HRW	RILEY-CO	KS	66502	67
STAR-SEED-830-DRYLAND	HRW	LABETTE	KS	67350	76
STAR-SEED-830-IRRIGATED	HRW	FINNEY-CO	KS	67846	73
STEPHENS	SWW	WASCO-CO	OR	97063	21
STEPHENS	SWW	MADRAS	OR	97741	23
STEPHENS	SWW	MADRAS	OR	97741	24
STEPHENS	SWW	MADRAS	OR	97741	24
STEPHENS	SWW	HERMISTON	OR	97838	24
STEPHENS	SWW	MADRAS	OR	97741	26
STEPHENS	SWW	MADRAS	OR	97741	26
STEPHENS	SWW	MADRAS	OR	97741	27
STEPHENS	SWW	PENDLETON	OR	97801	27
STEPHENS	SWW	MADRAS	OR	97741	27
STEPHENS	SWW	MADRAS	OR	97741	27
STEPHENS	SWW	MADRAS	OR	97741	28
STEPHENS	SWW	MORO	OR	97039	30
STOA	HRS	SELBY	SD	57472	64
STOA	HRS	CROOKSTON	MN	56716	73
STOA	HRS	HIGHMORE	SD	57345	77
STOA	HRS	MORRIS	MN	56267	79
STOA	HRS	BROOKINGS	SD	57006	85
STOA	HRS	ST-PAUL	MN	55101	87
TAM-101	HRW	CHILICOTHE	TX	76384	52
TAM-101	HRW	WOODWARD	OK	73801	52
TAM-101	HRW	OLNEY	TX	76374	53
TAM-101	HRW	MUNDAY	TX	76301	57
TAM-101	HRW	TOLBERT	TX	76384	63
TAM-101-87	HRW	WOODWARD	OK	73801	45
TAM-101-87	HRW	STILLWELL	OK	74960	45
TAM-101-87	HRW	LAHOMA	OK	73754	51
TAM-101-87	HRW	GOODWELL	OK	73939	57
TAM-101-87-IRRIGATED	HRW	GOODWELL	OK	73939	55
TAM-101-88	HRW	ALTUS	OK	73521	44
TAM-101-88	HRW	LAHOMA	OK	73754	51
TAM-101-88	HRW	ALTUS	OK	73521	57
TAM-101-88	HRW	GOODWELL	OK	73939	58

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
TAM-101-88	HRW	STILLWELL	OK	74960	63
TAM-101-88-IRRIGATED	HRW	GOODWELL	OK	73939	62
TAM-105	HRW	CHILICOTHE	TX	76384	63
TAM-105	HRW	FRANKLIN-CO	KS	66067	63
TAM-105	HRW	MUNDAY	TX	76301	65
TAM-105	HRW	OLNEY	TX	76374	66
TAM-105	HRW	NORDIN	OK	74631	68
TAM-105	HRW	TOLBERT	TX	76384	73
TAM-105-DRYLAND	HRW	RENO-CO	KS	67501	44
TAM-105-DRYLAND	HRW	THOMAS-CO	KS	66701	53
TAM-105-DRYLAND	HRW	GREELEY-CO	KS	67879	56
TAM-105-DRYLAND	HRW	BROWN-CO	KS	66434	56
TAM-105-DRYLAND	HRW	STAFFORD-CO	KS	67576	62
TAM-105-DRYLAND	HRW	HARVEY-CO	KS	67114	63
TAM-105-DRYLAND	HRW	REPUBLIC-CO	KS	66935	64
TAM-105-DRYLAND	HRW	RILEY-CO	KS	66502	65
TAM-105-DRYLAND	HRW	ELLIS-CO	KS	67601	69
TAM-105-DRYLAND	HRW	LABETTE	KS	67350	74
TAM-105-DRYLAND	HRW	FINNEY-CO	KS	67846	76
TAM-105-DRYLAND	HRW	GREELEY-CO	KS	67879	79
TAM-105-IRRIGATED	HRW	STAFFORD-CO	KS	67576	57
TAM-105-IRRIGATED	HRW	FINNEY-CO	KS	67846	66
TAM-105-IRRIGATED	HRW	THOMAS-CO	KS	66701	69
TAM-107	HRW	OLNEY	TX	76374	59
TAM-107	HRW	MORAN	KS	66755	63
TAM-107	HRW	TOLBERT	TX	76384	70
TAM-107	HRW	NORDIN	OK	74631	70
TAM-107	HRW	BURDETT	KS	67523	71
TAM-107	HRW	FRANKLIN-CO	KS	66067	71
TAM-107	HRW	CHILICOTHE	TX	76384	74
TAM-107	HRW	MUNDAY	TX	76301	74
TAM-107	HRW	SUBLETTE	KS	67877	74
TAM-107	HRW	LARNED	KS	67550	79
TAM-107	HRW	SATANTA	KS	67870	79
TAM-107	HRW	WINONA	KS	67764	79
TAM-107	HRW	TIMKEN	KS	67582	81
TAM-107	HRW	BELVUE	KS	66407	81
TAM-107	HRW	GARDEN-CITY	KS	67846	82
TAM-107	HRW	MANTER	KS	67862	83
TAM-107-DRYLAND	HRW	LABETTE	KS	67350	53
TAM-107-DRYLAND	HRW	RENO-CO	KS	67501	54
TAM-107-DRYLAND	HRW	GREELEY-CO	KS	67879	65
TAM-107-DRYLAND	HRW	STAFFORD-CO	KS	67576	68
TAM-107-DRYLAND	HRW	BROWN-CO	KS	66434	71
TAM-107-DRYLAND	HRW	GREELEY-CO	KS	67879	71
TAM-107-DRYLAND	HRW	THOMAS-CO	KS	66701	72
TAM-107-DRYLAND	HRW	RILEY-CO	KS	66502	72
TAM-107-DRYLAND	HRW	REPUBLIC-CO	KS	66935	73
DRYLAND	HRW	ELLIS-CO	KS	67601	73
DRYLAND	HRW	FINNEY-CO	KS	67846	74
IRRIGATED	HRW	FINNEY-CO	KS	67846	69

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
PAM-107-IRRIGATED	HRW	THOMAS-CO	KS	66701	72
PAM-108	HRW	CHILICOTHE	TX	76384	39
PAM-108	HRW	TOLBERT	TX	76384	42
PAM-108	HRW	OLNEY	TX	76374	43
PAM-108	HRW	MORO	OR	97039	43
PAM-108	HRW	NORDIN	OK	74631	48
PAM-108	HRW	FRANKLIN-CO	KS	66067	49
PAM-108	HRW	THOMAS-CO	KS	66701	64
PAM-108-DRYLAND	HRW	RENO-CO	KS	67501	33
PAM-108-DRYLAND	HRW	RENO-CO	KS	67501	40
PAM-108-DRYLAND	HRW	STAFFORD-CO	KS	67576	44
PAM-108-DRYLAND	HRW	BROWN-CO	KS	66434	45
PAM-108-DRYLAND	HRW	HARVEY-CO	KS	67114	47
PAM-108-DRYLAND	HRW	GREELEY-CO	KS	67879	50
PAM-108-DRYLAND	HRW	RILEY-CO	KS	66502	51
PAM-108-DRYLAND	HRW	REPUBLIC-CO	KS	66935	55
PAM-108-DRYLAND	HRW	FINNEY-CO	KS	67846	59
PAM-108-DRYLAND	HRW	GREELEY-CO	KS	67879	66
PAM-108-DRYLAND	HRW	ELLIS-CO	KS	67601	67
PAM-108-DRYLAND	HRW	LABETTE	KS	67350	79
PAM-108-IRRIGATED	HRW	FINNEY-CO	KS	67846	47
PAM-108-IRRIGATED	HRW	STAFFORD-CO	KS	67576	50
PAM-108-IRRIGATED	HRW	THOMAS-CO	KS	66701	55
TAM-200	HRW	TOLBERT	TX	76384	64
TAM-200	HRW	OLNEY	TX	76374	65
TAM-200	HRW	NORDIN	OK	74631	66
TAM-200	HRW	MUNDAY	TX	76301	72
TAM-200	HRW	CHILICOTHE	TX	76384	73
TAM-200-DRYLAND	HRW	RENO-CO	KS	67501	43
TAM-200-DRYLAND	HRW	HARVEY-CO	KS	67114	46
TAM-200-DRYLAND	HRW	STAFFORD-CO	KS	67576	53
TAM-200-DRYLAND	HRW	RILEY-CO	KS	66502	55
TAM-200-DRYLAND	HRW	THOMAS-CO	KS	66701	57
TAM-200-DRYLAND	HRW	REPUBLIC-CO	KS	66935	59
TAM-200-DRYLAND	HRW	ELLIS-CO	KS	67601	60
TAM-200-DRYLAND	HRW	GREELEY-CO	KS	67879	68
TAM-200-IRRIGATED	HRW	FINNEY-CO	KS	67846	59
TAM-200-IRRIGATED	HRW	GREELEY-CO	KS	67879	59
TAM-200-IRRIGATED	HRW	THOMAS-CO	KS	66701	59
TAM-201	HRW	OLNEY	TX	76374	55
TAM-201	HRW	CHILICOTHE	TX	76384	67
TAM-201	HRW	TOLBERT	TX	76384	69
TAM-201	HRW	MUNDAY	TX	76301	73
TERRA-SR86-DRYLAND	SRW	LABETTE	KS	67350	30
THUNDERBIRD	HRW	DERBY	KS	67037	60
THUNDERBIRD	HRW	GARDEN-CITY	KS	67846	67
THUNDERBIRD	HRW	GREELEY	KS	66033	67
THUNDERBIRD	HRW	PALMER	KS	66962	68
THUNDERBIRD	HRW	HUGOTON	KS	67951	68
THUNDERBIRD	HRW	LITTLE-RIVER	KS	67457	70
THUNDERBIRD	HRW	GIRARD	KS	66743	71

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
THUNDERBIRD	HRW	GARDEN-CITY	KS	67846	80
THUNDERBIRD	HRW	GARDEN-CITY	KS	67846	81
THUNDERBIRD	HRW	ULYSSES	KS	67880	85
THUNDERBIRD-DRYLAND	HRW	RENO-CO	KS	67501	51
THUNDERBIRD-DRYLAND	HRW	BROWN-CO	KS	66434	61
THUNDERBIRD-DRYLAND	HRW	HARVEY-CO	KS	67114	66
THUNDERBIRD-DRYLAND	HRW	FRANKLIN-CO	KS	66067	66
THUNDERBIRD-DRYLAND	HRW	RILEY-CO	KS	66502	68
THUNDERBIRD-DRYLAND	HRW	REPUBLIC-CO	KS	66935	68
THUNDERBIRD-DRYLAND	HRW	THOMAS-CO	KS	66701	70
THUNDERBIRD-DRYLAND	HRW	FINNEY-CO	KS	67846	71
THUNDERBIRD-DRYLAND	HRW	GREELEY-CO	KS	67879	78
THUNDERBIRD-DRYLAND	HRW	ELLIS-CO	KS	67601	80
THUNDERBIRD-DRYLAND	HRW	LABETTE	KS	67350	80
THUNDERBIRD-IRRIGATED	HRW	STAFFORD-CO	KS	67576	67
THUNDERBIRD-IRRIGATED	HRW	FINNEY-CO	KS	67846	69
THUNDERBIRD-IRRIGATED	HRW	THOMAS-CO	KS	66701	70
THUNDERBIRD-IRRIGATED	HRW	GREELEY-CO	KS	67879	72
TRAILBLAZER	HRW	NORDIN	OK	74631	68
TRAILBLAZER-DRYLAND	HRW	BROWN-CO	KS	66434	65
TRAILBLAZER-DRYLAND	HRW	REPUBLIC-CO	KS	66935	65
TRES	CLUB	WASCO-CO	OR	97063	25
TRES	CLUB	MORO	OR	97039	27
TRES	CLUB	HERMISTON	OR	97838	30
TRES	CLUB	PENDLETON	OR	97801	31
TRIUMPH-64	HRW	INMAN	KS	67546	55
TRIUMPH-64-87	HRW	STILLWELL	OK	74960	40
TRIUMPH-64-87	HRW	WOODWARD	OK	73801	41
TRIUMPH-64-87-IRRIGATED	HRW	GOODWELL	OK	73939	57
TRIUMPH-64-88	HRW	ALTUS	OK	73521	40
TRIUMPH-64-88	HRW	ALTUS	OK	73521	52
TRIUMPH-64-88	HRW	WOODWARD	OK	73801	53
TRIUMPH-64-88	HRW	GOODWELL	OK	73939	53
TRIUMPH-64-88	HRW	STILLWELL	OK	74960	54
TRIUMPH-64-88	HRW	LAHOMA	OK	73754	57
TRIUMPH-64-88-IRRIGATED	HRW	GOODWELL	OK	73939	59
TRIUMPH-64-DRYLAND	HRW	RENO-CO	KS	67501	47
TRIUMPH-64-DRYLAND	HRW	LABETTE	KS	67350	68
VICTORY	HRW	WINFIELD	KS	67156	54
VICTORY	HRW	BELLE-PLAINE	KS	67013	57
VICTORY	HRW	WILSEY	KS	66873	59
VICTORY	HRW	PALMER	KS	66962	69
VICTORY	HRW	OSBORN	KS	67473	72
VICTORY	HRW	GARDEN-CITY	KS	67846	78
VICTORY-DRYLAND	HRW	BROWN-CO	KS	66434	57
VICTORY-DRYLAND	HRW	HARVEY-CO	KS	67114	58
VICTORY-DRYLAND	HRW	RILEY-CO	KS	66502	60
VICTORY-DRYLAND	HRW	FRANKLIN-CO	KS	66067	63
VICTORY-DRYLAND	HRW	STAFFORD-CO	KS	67576	63
VICTORY-DRYLAND	HRW	REPUBLIC-CO	KS	66935	63
VICTORY-DRYLAND	HRW	THOMAS-CO	KS	66701	67

TABLE 4. NIR HARDNESS OF BREEDERS' SAMPLES, LISTED BY VARIETY.

VARIETY	CLASS	REGION	STATE	ZIPCODE	HARDNESS
VICTORY-DRYLAND	HRW	ELLIS-CO	KS	67601	67
VICTORY-DRYLAND	HRW	FINNEY-CO	KS	67846	68
VICTORY-DRYLAND	HRW	LABETTE	KS	67350	68
VICTORY-IRRIGATED	HRW	FINNEY-CO	KS	67846	61
VICTORY-IRRIGATED	HRW	STAFFORD-CO	KS	67576	61
VICTORY-IRRIGATED	HRW	GREELEY-CO	KS	67879	63
VICTORY-IRRIGATED	HRW	THOMAS-CO	KS	66701	66
VONA-DRYLAND	HRW	STAFFORD-CO	KS	67576	51
W85-120-EXP-DRYLAND	HRW	BROWN-CO	KS	66434	64
W85-120-EXP-DRYLAND	HRW	FRANKLIN-CO	KS	66067	67
W85-120-EXP-DRYLAND	HRW	LABETTE	KS	67350	80
W85-162-EXP-DRYLAND	HRW	RILEY-CO	KS	66502	59
WHEATON	HRS	CROOKSTON	MN	56716	70
WHEATON	HRS	MORRIS	MN	56267	75
WRANGLER	HRW	NORDIN	OK	74631	67

TABLE 5. AVERAGE NIR HARDNESS OF ALL SAMPLES FOR EACH VARIETY.

VARIETY	CLASS	STATE	NO. SAMPLES	HARDNESS	
				MEAN	STD. DEV.
40A-DYNASTY	SRW	OH	1	22	-
906-R	HRS	ND	1	74	-
ABILENE	HRW	KS	11	70	5
ABILENE	HRW	OK	1	64	-
ABILENE-DRYLAND	HRW	KS	12	62	7
ABILENE-IRRIGATED	HRW	KS	2	60	0
AGRI-PRO	HRW	KS	2	66	21
ALEX	HRS	ND	4	87	4
ANZA	HRW	CA	17	75	5
APEX	HRS	ND	1	69	-
ARKAN	HRW	KS	89	61	6
ARKAN	HRW	OK	2	58	1
ARKAN-DRYLAND	HRW	KS	12	57	6
ARKAN-IRRIGATED	HRW	KS	4	60	4
AUBURN	SRW	MO	1	33	-
BACA	HRW	CO	4	60	3
BECKER	SRW	OH	5	21	3
BECKER-DRYLAND	SRW	KS	2	21	6
BH-122	HRW	OK	1	51	-
BH-122-DRYLAND	HRW	KS	8	53	8
BH-122-IRRIGATED	HRW	KS	3	53	5
BH-203A-DRYLAND	HRW	KS	7	44	6
BH-203A-IRRIGATED	HRW	KS	3	45	3
BH-206-DRYLAND	HRW	KS	1	47	-
BH-206-IRRIGATED	HRW	KS	1	62	-
BH-301	HRW	OK	1	63	-
BOUNTY	HRW	KS	1	84	-
BOUNTY-205	HRW	KS	2	37	2
BRONCO-DRYLAND	HRW	KS	3	60	4
BRONZE-CHIEF	HRS	MT	1	72	-
BRULE	HRW	CO	5	59	11
BRULE	HRW	KS	1	69	-
BRULE	HRW	NE	11	60	5
BUCKSKIN	HRW	NE	4	70	2
BUTTE	HRS	ND	1	96	-
BUTTE	HRS	SD	1	72	-
BUTTE-86	HRS	MN	6	87	2
BUTTE-86	HRS	MT	1	88	-
BUTTE-86	HRS	ND	26	89	7
BUTTE-86	HRS	SD	3	82	4
CALDWELL	SRW	KS	3	22	3
CALDWELL	SRW	MO	10	28	6
CALDWELL	SRW	OH	8	27	3
CALDWELL	SRW	OK	1	32	-
CALDWELL-DRYLAND	SRW	KS	3	22	3
CALDWELL-IRRIGATED	SRW	KS	1	25	-
CARDINAL	SRW	OH	4	23	1
CARSON	HRW	CO	2	67	2
CARSON	HRW	OK	1	68	-

TABLE 5. AVERAGE NIR HARDNESS OF ALL SAMPLES FOR EACH VARIETY.

VARIETY	CLASS	STATE	NO. SAMPLES	HARDNESS	
				MEAN	STD. DEV.
CARSON-DRYLAND	HRW	KS	3	65	4
CELTIC	HRS	MN	1	81	-
CELTIC	HRS	ND	1	80	-
CENTURA	HRW	NE	18	64	8
CENTURA-DRYLAND	HRW	KS	7	67	9
CENTURK	HRW	NE	3	63	12
CENTURK-78	HRW	KS	1	64	-
CENTURK-78	HRW	NE	3	69	5
CENTURY	HRW	OR	2	55	4
CENTURY	HRW	TX	3	58	5
CENTURY-87	HRW	OK	3	49	7
CENTURY-87-IRRIGATED	HRW	OK	1	59	-
CENTURY-88	HRW	OK	6	55	10
CENTURY-88-IRRIGATED	HRW	OK	1	54	-
CENTURY-DRYLAND	HRW	KS	9	61	8
CENTURY-IRRIGATED	HRW	KS	3	59	4
CENEY	HRW	KS	1	72	-
CHEYENNE	HRW	NE	1	61	-
CHEYENNE	HRW	OR	2	63	2
CHISHOLM	HRW	KS	1	40	-
CHISHOLM	HRW	OK	92	45	7
CHISHOLM	HRW	TX	3	32	1
CHISHOLM-87	HRW	OK	4	30	7
CHISHOLM-88	HRW	OK	6	37	8
CHISHOLM-88-IRRIGATED	HRW	OK	1	38	-
CHISHOLM-DRYLAND	HRW	KS	10	40	5
CHISHOLM-IRRIGATED	HRW	KS	2	45	1.2
COB20026-EXP-DRYLAND	HRW	KS	1	60	-
COB20026-EXP-IRRIGATED	HRW	KS	2	58	6
CODY	HRW	NE	5	57	1.0
CODY-DRYLAND	HRW	KS	4	73	3
CODY-IRRIGATED	HRW	KS	2	66	1
COLLIN	HRW	TX	4	25	3
COLT	HRW	KS	1	62	-
COLT	HRW	NE	8	52	7
COLT	HRW	OR	2	47	6
COLT-DRYLAND	HRW	KS	5	56	6
COLT-IRRIGATED	HRW	KS	1	62	-
COLUMBUS	HRS	ND	5	86	11
COMPTON-DRYLAND	SRW	KS	4	21	4
COMPTON-IRRIGATED	SRW	KS	1	18	-
CONCHO	HRW	KS	1	66	-
CONCHO	HRW	OK	5	39	2
COTEAU	HRS	ND	10	89	5
CREE	HRW	MT	1	63	-
CUTLESS	HRS	MT	1	81	-
DAWN	HRW	SD	4	55	5
DELANGE-7834-DRYLAND	HRW	KS	1	62	-
DELANGE-7837-DRYLAND	HRW	KS	8	56	8

TABLE 5. AVERAGE NIR HARDNESS OF ALL SAMPLES FOR EACH VARIETY.

VARIETY	CLASS	STATE	NO. SAMPLES	HARDNESS	
				MEAN	STD. DEV.
DELANGE-7846-DRYLAND	HRW	KS	8	55	9
DODGE	HRW	KS	6	68	4
DODGE	HRW	OR	2	53	6
DODGE-DRYLAND	HRW	KS	9	65	8
DODGE-IRRIGATED	HRW	KS	2	61	7
DUSTY	SRW	OR	4	17	4
DYNASTY	SRW	OH	1	23	-
EAGLE	HRW	KS	9	73	5
FORTUNA	HRS	MT	1	81	-
FS402	SRW	OH	2	25	0
GARST	HRW	KS	1	65	-
GARST-HR48	HRW	KS	1	73	-
GARST-HR64	HRW	KS	2	69	10
GENIE-II	SRW	MO	1	29	-
GLENMAN	HRS	MT	3	75	11
GR860	SRW	OH	2	25	0
GR876	SRW	OH	2	28	3
GUARD	HRS	MN	2	75	1
GUARD	HRS	SD	4	68	5
GUERT-2	HRW	MT	1	64	-
HAIL	HRW	CO	1	58	-
HART	SRW	OH	1	30	-
HAWK	HRW	CO	6	64	8
HAWK	HRW	KS	26	69	6
HAWK	HRW	NE	6	61	8
HAWK	HRW	TX	3	68	7
HILL-81	SRW	OR	5	24	3
KARL	HRW	OK	1	58	-
KARL	HRW	TX	4	59	8
KARL-DRYLAND	HRW	KS	9	62	9
KARL-IRRIGATED	HRW	KS	4	62	5
WASSTO	HRW	CA	7	65	3
	HRW	OR	1	68	-
	HRW	OR	2	68	4
			4	56	9
			1	68	-
			1	70	-
			1	67	-
			2	74	4
			1	69	-
			28	70	4
			10	63	8
			3	78	5
			18	85	4
			3	80	8
			2	25	2
			3	26	5
			48	79	8
			14	82	7

TABLE 5. AVERAGE NIR HARDNESS OF ALL SAMPLES FOR EACH VARIETY.

VARIETY	CLASS	STATE	NO. SAMPLES	HARDNESS	
				MEAN	STD. DEV.
MARSHALL	HRS	SD	4	72	5
MESA	HRW	CO	1	65	-
MESA	HRW	KS	16	69	6
MESA	HRW	TX	4	64	6
MESA-DRYLAND	HRW	KS	11	64	7
MESA-IRRIGATED	HRW	KS	3	62	2
MO-9965-EXP-DRYLAND	SRW	KS	4	13	3
MUSTANG	HRW	CO	2	52	0
MUSTANG	HRW	KS	24	67	7
MUSTANG	HRW	OK	7	62	5
MUSTANG	HRW	TX	3	58	6
MUSTANG-87	HRW	OK	3	52	10
MUSTANG-87-IRRIGATED	HRW	OK	1	51	-
MUSTANG-88	HRW	OK	1	39	-
MUSTANG-DRYLAND	HRW	KS	10	60	8
MUSTANG-IRRIGATED	HRW	KS	2	61	1
McNAIR-1003	SRW	KS	1	25	-
NEWANA	HRS	MT	4	75	4
NEWTON	HRW	CO	2	60	5
NEWTON	HRW	KS	59	62	6
NEWTON-DRYLAND	HRW	KS	12	57	7
NEWTON-IRRIGATED	HRW	KS	3	52	2
NK-711	HRS	MN	1	79	-
NK-812	HRW	OK	2	82	4
NK-830	HRW	KS	2	77	1
NK-PRO-812	HRW	TX	3	70	7
NORKAN	HRW	KS	12	64	6
NORKAN	HRW	NE	1	59	-
NORKAN	HRW	OK	1	65	-
NORKAN	HRW	OR	2	64	5
NORKAN-DRYLAND	HRW	KS	10	61	8
NORKAN-IRRIGATED	HRW	KS	3	62	3
NORSEMAN	HRS	ND	4	93	17
NORSTAR	HRW	MT	1	64	-
OR-CR8313	HRW	OR	4	63	3
OR8400464P	SWW	OR	2	24	6
OR8400882H	SWW	OR	3	26	2
OR8500305P	SWW	OR	2	24	6
OR8500374H	HWW	OR	2	62	4
OR8500378H	HWW	OR	3	60	5
OR8500974P	SWW	OR	3	29	4
OR8502288H	SWW	OR	3	23	4
OR8505311P	SWW	OR	3	37	13
OR8600049	HWW	OR	3	67	4
OR8600341	HWW	OR	3	66	2
OR8600471	HWW	OR	2	51	5
OR8600701	HWW	OR	3	69	4
OR860292	SWW	OR	2	23	3
OR860293	SWW	OR	3	23	2

TABLE 5. AVERAGE NIR HARDNESS OF ALL SAMPLES FOR EACH VARIETY.

VARIETY	CLASS	STATE	NO. SAMPLES	HARDNESS	
				MEAN	STD. DEV.
OR860296	SWW	OR	3	31	1
OR860297	HWW	OR	2	28	4
OR860301	SWW	OR	3	22	1
OR860302	SWW	OR	3	24	3
OR860303	SWW	OR	3	23	4
OR860436	SWW	OR	2	22	2
OR860553	SWW	OR	3	28	3
OR860571	SWW	OR	3	22	5
OR860575	SWW	OR	2	21	5
OR860576	SWW	OR	3	31	1
OR860754	SWW	OR	3	30	5
OR860756	HWW	OR	3	47	8
OR861219	SWW	OR	2	28	2
OR861226	SWW	OR	3	28	1
OR861425	SWW	OR	3	28	2
OVESON	SWW	OR	5	25	6
PARKER	HRW	KS	2	69	6
PIKE	SRW	MO	7	14	5
PIONEER	HRW	KS	2	53	0
PIONEER	HRW	MN	1	88	-
PIONEER	HRW	ND	1	89	-
PIONEER	HRW	OK	6	61	8
PIONEER	SRW	OH	3	25	6
PIONEER-17707	HRS	ND	1	97	-
PIONEER-2154	HRW	KS	1	71	-
PIONEER-2154	HRW	OK	1	78	-
PIONEER-2154-DRYLAND	HRW	KS	10	75	7
PIONEER-2154-IRRIGATED	HRW	KS	2	76	1
PIONEER-2157	HRW	KS	13	59	5
PIONEER-2157	HRW	OK	41	60	6
PIONEER-2157-88	HRW	OK	5	55	5
PIONEER-2157-88-IRRIGATED	HRW	OK	1	54	-
PIONEER-2157-DRYLAND	HRW	KS	9	55	8
PIONEER-2157-IRRIGATED	HRW	KS	3	55	3
PIONEER-2163	HRW	OK	1	62	-
PIONEER-2165	HRW	KS	2	67	1
PIONEER-2172	HRW	KS	2	66	13
PIONEER-2172	HRW	OK	1	74	-
PIONEER-2172-DRYLAND	HRW	KS	11	71	9
PIONEER-2172-IRRIGATED	HRW	KS	3	74	3
PIONEER-2306	HRS	MN	1	78	-
PIONEER-2360	HRS	MN	2	81	4
PIONEER-2364	HRS	SD	1	79	-
PIONEER-2369	HRS	MN	1	95	-
PIONEER-2369	HRS	ND	2	90	0
PIONEER-2369	HRS	SD	2	74	4
PIONEER-2385	HRS	MN	3	80	4
PIONEER-2385	HRS	ND	3	83	3
PIONEER-2550	SRW	OH	1	22	-

TABLE 5. AVERAGE NIR HARDNESS OF ALL SAMPLES FOR EACH VARIETY.

VARIETY	CLASS	STATE	NO. SAMPLES	HARDNESS	
				MEAN	STD. DEV.
PIONEER-2551	SRW	KS	1	23	-
PIONEER-2551	SRW	OR	2	23	2
PIONEER-2551-DRYLAND	SRW	KS	3	19	3
PIONEER-5757	HRW	KS	2	56	2
PLAINSMAN	HRW	KS	1	67	-
PRO-BRAND-830	HRW	KS	11	69	5
QUANTUM	HRW	KS	1	60	-
QUANTUM-378	HRW	OK	1	57	-
QUANTUM-562-DRYLAND	HRW	KS	3	61	2
QUANTUM-564	HRW	OK	1	54	-
QUANTUM-578-DRYLAND	HRW	KS	2	70	9
QUANTUM-578-IRRIGATED	HRW	KS	3	59	4
REDLAND	HRW	NE	4	60	9
REDLAND	HRW	SD	4	53	4
REDLAND-DRYLAND	HRW	KS	5	62	3
REDWIN	HRW	MT	1	82	-
RH-7833	HRW	OK	1	57	-
RH-7837	HRW	OK	1	55	-
RH7837	HRW	KS	1	61	-
RH7846	HRW	KS	2	59	3
RIO-BLANCO	HWW	OK	1	58	-
RIO-BLANCO-DRYLAND	HWW	KS	10	58	7
RIO-BLANCO-IRRIGATED	HWW	KS	4	58	1
ROCKY	HRW	KS	1	77	-
ROCKY	HRW	NE	1	76	-
ROSE	HRW	SD	4	61	4
ROUGH RIDER	HRW	SD	4	63	4
SAGE	HRW	KS	1	68	-
SAGE	HRW	NE	1	43	-
SANDY	HRW	CO	17	63	6
SANDY	HRW	KS	1	73	-
SANDY-DRYLAND	HRW	KS	2	71	4
SCOTTY	SRW	OH	1	28	-
SCOUT	HRW	CO	1	63	-
SCOUT	HRW	KS	1	68	-
SCOUT	HRW	NE	1	57	-
SCOUT-66	HRW	CO	2	63	2
SCOUT-66	HRW	KS	5	72	6
SCOUT-66	HRW	NE	5	56	6
SCOUT-66	HRW	SD	3	64	2
SCOUT-66	HRW	TX	4	65	2
SCOUT-66-DRYLAND	HRW	KS	9	67	4
SIOUXLAND	HRW	KS	10	62	5
SIOUXLAND	HRW	NE	10	59	9
SIOUXLAND	HRW	OK	5	62	3
SIOUXLAND	HRW	SD	3	57	3
SIOUXLAND	HRW	TX	4	62	4
SIOUXLAND-87	HRW	OK	4	53	6
SIOUXLAND-87-IRRIGATED	HRW	OK	1	59	-

TABLE 5. AVERAGE NIR HARDNESS OF ALL SAMPLES FOR EACH VARIETY.

VARIETY	CLASS	STATE	NO. SAMPLES	HARDNESS	
				MEAN	STD. DEV.
IOUXLAND-88	HRW	OK	4	66	5
IOUXLAND-88-IRRIGATED	HRW	OK	1	60	-
IOUXLAND-DRYLAND	HRW	KS	9	63	11
IOUXLAND-IRRIGATED	HRW	KS	4	62	2
IOUAR-DNS	HRS	MT	1	82	-
STALLION	HRW	CO	1	57	-
STALLION	HRW	KS	3	66	3
STALLION	HRW	OK	2	64	1
STALLION-DRYLAND	HRW	KS	4	50	9
STALLION-IRRIGATED	HRW	KS	3	61	2
STAR-SEED-830-DRYLAND	HRW	KS	4	68	5
STAR-SEED-830-IRRIGATED	HRW	KS	1	73	-
STEPHENS	SWW	OR	13	26	2
STOA	HRS	MN	12	79	7
STOA	HRS	ND	24	84	6
STOA	HRS	SD	3	75	10
SUPER-HAWK	HRW	CO	1	50	-
TAM-101	HRW	KS	2	57	2
TAM-101	HRW	OK	4	58	5
TAM-101	HRW	TX	4	56	5
TAM-101-87	HRW	OK	4	50	6
TAM-101-87-IRRIGATED	HRW	OK	1	55	-
TAM-101-88	HRW	OK	5	55	8
TAM-101-88-IRRIGATED	HRW	OK	1	62	-
TAM-105	HRW	CO	1	83	-
TAM-105	HRW	KS	14	69	12
TAM-105	HRW	OK	1	68	-
TAM-105	HRW	TX	4	66	5
TAM-105-DRYLAND	HRW	KS	12	63	10
TAM-105-IRRIGATED	HRW	KS	3	64	6
TAM-106	HRW	KS	1	78	-
TAM-107	HRW	CO	5	78	7
TAM-107	HRW	KS	21	76	9
TAM-107	HRW	NE	4	77	3
TAM-107	HRW	OK	1	70	-
TAM-107	HRW	TX	4	69	7
TAM-107-DRYLAND	HRW	KS	11	68	7
TAM-107-IRRIGATED	HRW	KS	2	70	2
TAM-108	HRW	CO	2	35	3
TAM-108	HRW	KS	6	55	6
TAM-108	HRW	OK	1	48	-
TAM-108	HRW	OR	1	43	-
		TX	3	41	2
		KS	12	53	13
		KS	3	51	4
		OK	1	66	-
		TX	4	69	5
		KS	8	55	8
		KS	3	59	0

TABLE 5. AVERAGE NIR HARDNESS OF ALL SAMPLES FOR EACH VARIETY.

VARIETY	CLASS	STATE	NO. SAMPLES	HARDNESS	
				MEAN	STD. DEV.
TAM-201	HRW	TX	4	66	8
TELEMARK	HRS	MN	1	83	-
TELEMARK	HRS	ND	1	90	-
TERRA-SR86-DRYLAND	SRW	KS	1	30	-
THUNDERBIRD	HRW	CO	2	66	1
THUNDERBIRD	HRW	KS	24	74	7
THUNDERBIRD	HRW	NE	2	65	1
THUNDERBIRD-DRYLAND	HRW	KS	11	69	9
THUNDERBIRD-IRRIGATED	HRW	KS	4	69	2
TITAN	SRW	OH	1	30	-
TRAILBLAZER	HRW	KS	2	63	6
TRAILBLAZER	HRW	OK	1	68	-
TRAILBLAZER-DRYLAND	HRW	KS	2	65	0
TRES	CLUB	OR	4	28	3
TRIUMPH	HRW	KS	8	62	7
TRIUMPH	HRW	OK	9	52	3
TRIUMPH-64	HRW	KS	1	55	-
TRIUMPH-64-87	HRW	OK	2	40	1
TRIUMPH-64-87-IRRIGATED	HRW	OK	1	57	-
TRIUMPH-64-88	HRW	OK	6	51	6
TRIUMPH-64-88-IRRIGATED	HRW	OK	1	59	-
TRIUMPH-64-DRYLAND	HRW	KS	2	58	15
TUT	HRW	KS	1	67	-
VICTORY	HRW	CO	4	64	3
VICTORY	HRW	KS	48	66	7
VICTORY-DRYLAND	HRW	KS	10	63	4
VICTORY-IRRIGATED	HRW	KS	4	63	2
VONA	HRW	CO	7	64	6
VONA	HRW	KS	3	65	7
VONA	HRW	NE	5	62	6
VONA	HRW	OK	5	54	5
VONA-DRYLAND	HRW	KS	1	51	-
W85-120-EXP-DRYLAND	HRW	KS	3	70	9
W85-162-EXP-DRYLAND	HRW	KS	1	59	-
WALDRON	HRS	ND	1	95	-
WEATHERMASTER-140A	HRW	KS	1	68	-
WHEATON	HRS	MN	8	78	8
WHEATON	HRS	ND	1	76	-
WINGS	HRW	CO	2	48	3
WINGS	HRW	KS	1	59	-
WRANGLER	HRW	KS	2	65	1
WRANGLER	HRW	OK	3	66	2
YECORA-ROJO	HRW	CA	20	73	2